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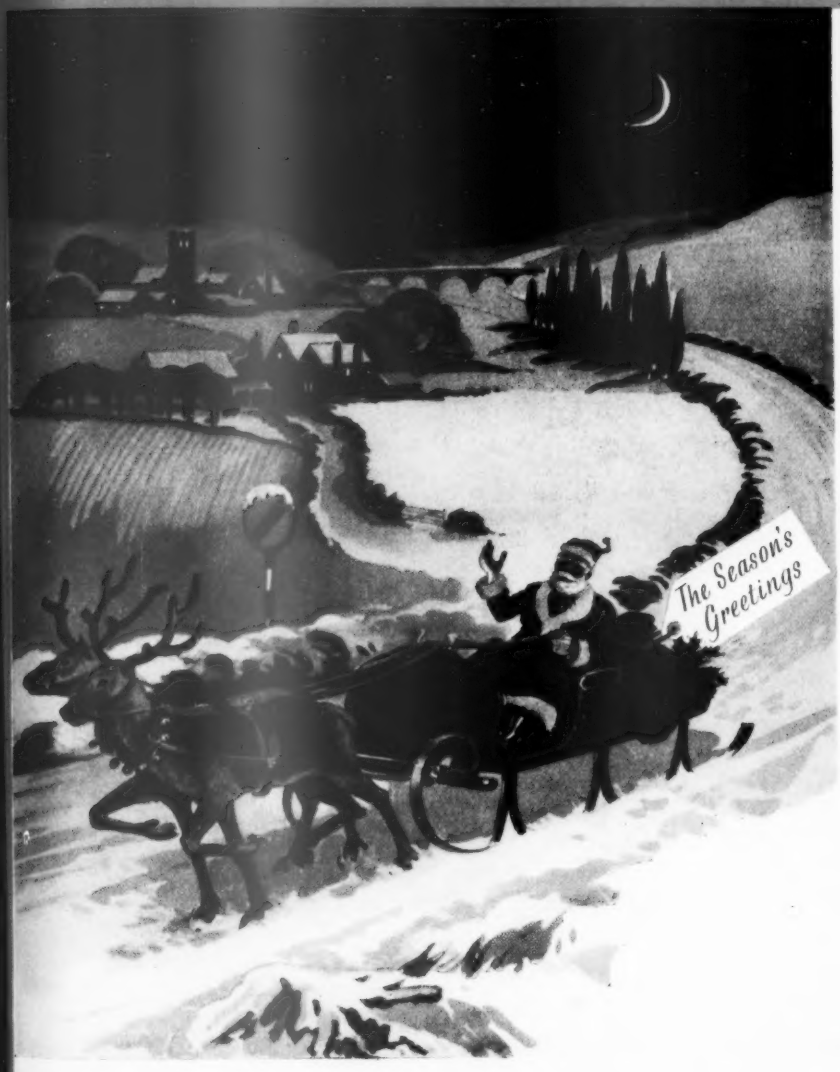

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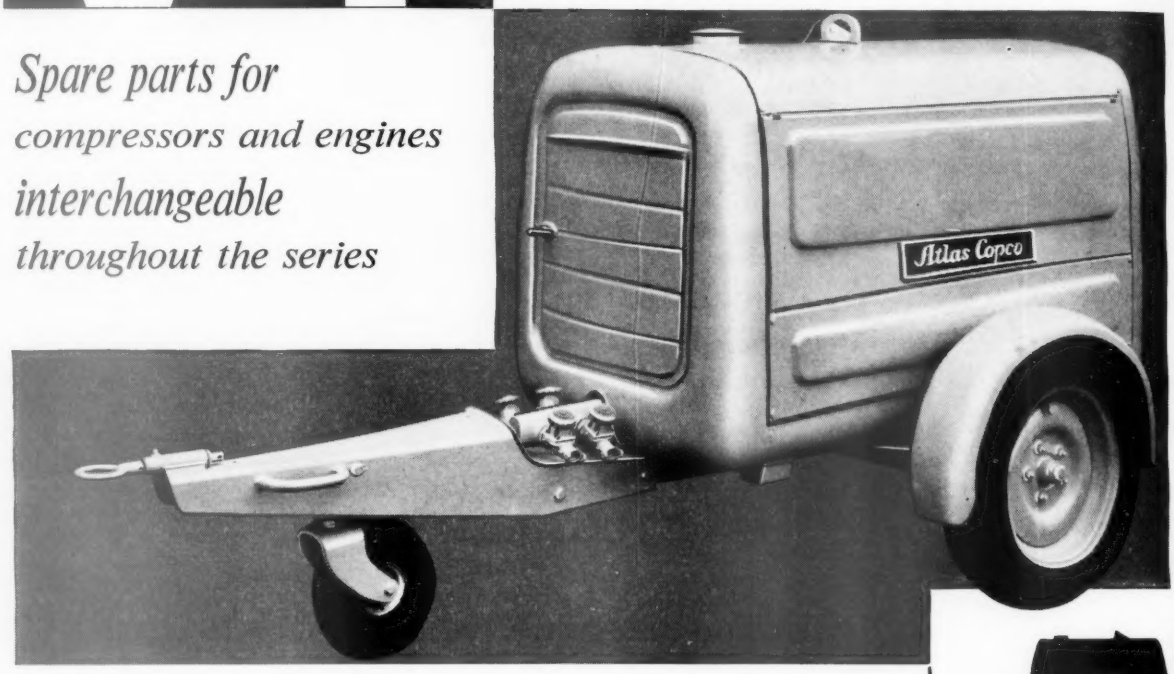

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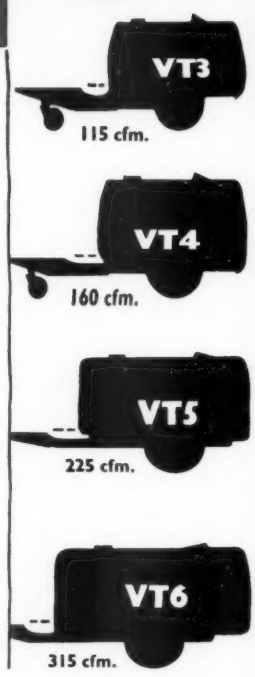

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British Railway's First A.C. Locomotive

THE handing over last week by Lord Chandos, Chairman, Associated Electrical Industries Limited, to Lord Rusholme, Chairman of the London Midland Area Board, British Transport Commission, of the first a.c. electric locomotive built for service in this country is not only a landmark in railway progress, but the implementation of one of the major stages of British Railways modernisation plan. The locomotive is the first of those to be used for the main-line service between London, Manchester, and Liverpool, after electrification at 25 kV. 50 cycles a.c., and like others in its class, it will be suitable for use in the later development of main-line electrification elsewhere. Many of the components have had to be specially designed to meet the arduous operating conditions forecast for future British Railways traffic, and represent a major advance in the technique of railway traction engineering. Used for the first time in service on British Railways is the Alsthom system of suspension and flexible link drive to the wheels. These features combine to give good riding characteristics and reduce unsprung weight and maintenance costs. The assistance given by Alsthom engineers in the general bogie design was gratefully acknowledged by Lord Chandos at the handing-over ceremony. Because many of the components are completely new a considerable amount of study and development has been required to produce the equipment now being put into service. This has enabled British manufacturers to gain valuable experience in developing new techniques which will be of great value in the promotion of sales to overseas countries. Next October representatives from railway administrations throughout the world will be visiting Britain to attend British Railways Electrification Conference, and they will undoubtedly have an opportunity to view the locomotive. This in turn will provide a useful basis for discussion, but, above all, it will serve a valuable purpose in demonstrating to an international gathering that development of equipment in this country for 50-cycle traction is striking out on lines of its own.

World Bank Loan for Pakistan Railways

FURTHER big orders for motive power and other railway equipment may be expected from Pakistan as the result of the loan of the equivalent of $12,500,000 made last week by the World Bank to help in financing an interim programme for rehabilitation, improvement, and expansion of the railways. The programme is designed to meet minimum requirements pending formulation of a programme of railway development to be carried out during the period of the second Five-Year plan, to begin July 1, 1960. The Netherlands Trading Society (Amsterdam), Manufactures Trust Company, and Irving Trust Company are participating in the loan, without the World Bank guarantee, for a total amount equivalent to $949,000. The loan is for a term of 15 years and bears interest of 6 per cent, including the 1 per cent commission allocated to the Bank's special reserve. Amortisation will begin May 15, 1963. Apart from the procurement of diesel locomotives and passenger and goods stock from abroad, recent news from Pakistan has been mainly of developments on the North Western Railway. It may be that the new loan will facilitate execution of works on the Eastern Bengal Railway, which serves the jute-producing area, the main source of the country's wealth.

Speed in Passenger Travel

THE inadequacy of an average speed of 60 m.p.h. including stops, for passenger trains, to enable railways to compete with the private motorcar over shorter distances is stressed by Mr. G. F. Fiennes, Line Traffic Manager, Great Northern, British Railways, Eastern Region, in his paper last week to the Railway Students' Association. He gives figures to show that even the 75-m.p.h. average envisaged in the British Railways modernisation plan affords journey times no shorter over distances of less than 120 miles than does the motorcar. This takes into account an average motoring speed of 15 m.p.h. in towns, and the motorist's need to stop for refreshments after 4 hr. To maintain high train speeds over longer distances he calls for "'Deltics' and electrics only, and those worked to the limit of their power." The policy of building for expresses 2,000-h.p. diesel locomotives with a maximum speed of 90 m.p.h., he states, "already lies in ruins around us." He is disturbed that so little has been achieved towards realising the 75 m.p.h. average. The St. Pancras-Manchester diesel-electric Pullman trains, for instance, are to average only some 60 m.p.h.—over a route with exceptionally severe gradients and sharp curves.

Regular Interval Services

AVERAGE speeds of 75 m.p.h., including stops, are going to be very difficult to achieve on the highly-trafficked main lines of British Railways, except perhaps on main routes such as the East Coast and London-Bristol main lines. It may be necessary to accept lower speeds—but not too low—on a good many routes. If so, the railways must be able to sell other advantages, such as a regular interval service, punctuality, and comfort. The last includes smooth and silent

riding and efficient ventilation. Pressure ventilation, if not air conditioning (which necessitates closed windows), is likely to become standard. Even over the longer distances in this country, it may be necessary to operate regular interval services to offset the unlimited availability of the private motor. Mr. Fiennes points out, however, that even from Kings Cross, whence is conveyed a very considerable proportion of long-distance passenger traffic in Britain, 60 per cent of travellers other than season-ticket holders last May were conveyed less than 120 miles. A solution on many main lines would seem to be a structure of fast and semi-fast trains at regular intervals on the model of the Southern Region electrified services, but faster, and with feeder services co-ordinated with the expresses. This implies extensive use of multiple-unit sets, diesel or electric, and the loss of some through carriage facilities.

Overseas Railway Traffics

SOUTH African Railways & Harbours total railway earnings in amounting to £3,407,261 for the week ended October 10, established a new record, exceeding the figures during the previous best week, that for the seven days ending August 28, 1959, by nearly £205,000. Goods earnings at £2,271,517 during the week ending October 6, exceeded the previous best week, from August 2 to August 9, 1959, by £23,000. Paraguay Central Railway receipts have continued to be favourable, with weekly returns generally higher than the equivalents for last year. At November 13, aggregate receipts amounted to G37,645,553 compared with G36,743,605 in the corresponding period of 1958. Salvador Railway Company receipts for September amounted to colones 160,000 compared with colones 283,000 in September, 1958, a decrease of colones 123,000. Aggregate receipts from July 1, amounted to colones 495,000 compared with colones 593,000 in the corresponding period of last year. Costa Rica Railway receipts for October amounted to colones 1,940,736 compared with colones 1,663,633 in October, 1958. Aggregate receipts from July 1, 1959 amounted to colones 8,467,198 compared with colones 7,117,881 in the corresponding period of 1958.

Oil Supplies for the Railways

THE adequacy in the foreseeable future of oil supplies for British industry and British Railways, and the ability of the oil industry to meet the railways' increasing needs as diesel traction developed, were among points made by Mr. Christopher Brunner, a Director of Shell-Mex & B.P. Limited, in his speech last week as guest speaker at the last dinner held by the Transportation Club at 44, Wilton Crescent, S.W.1. A brief account of this function is given on another page. In conversion of British Railways to diesel traction, he stated, the peak would be reached only towards 1963, when total annual consumption would be 900,000 tons. This compared with 77,000 tons in 1958, much of it for shunting locomotives and multiple-unit trains. By 1965 the railways' needs were likely to be 1,000,000 tons a year. This represented only some 2.2 per cent of the total inland consumption of petroleum products in Britain. Meanwhile new sources of oil were being developed. Mr. Brunner stressed that countries in the Middle East supplying oil appreciated the value of markets in the West. British Railways, he added, would probably have to increase its oil storage capacity of some 3,000,000 gal. perhaps more than four-fold by 1964. His company was lending temporary storage in the form of tanks and tank wagons. For speed in the bulk carriage and direct movement the oil industry would continue to make as much use as economically possible of rail services. The industry was one of the largest private customers of British Railways. Shell-Mex and its associates were already spending £4,000,000 a year on rail transport of their products.

Electrification in Czechoslovakia

ELECTRIC locomotives and electric equipment of various kinds for railways are stated to be amongst the items required by Czechoslovakia which no doubt will figure in the forthcoming trade discussions between that country and the United Kingdom. Out of a total route-mileage of about 8,200, the Czechoslovak State Railways (C.S.D.) have now completed the electrification, mainly at 3,000 V. d.c., of some 200 route-miles. Progress since the war has been slow in comparison with that of some other European systems, but there has been an acceleration during the past five years. The future policy of the C.S.D. is to electrify at a gradually increasing tempo, still on the d.c. system, all important lines, and to introduce diesel traction on the others. No further steam locomotives are to be built at the W1 Lenin workshops at Pilsen, as the existing fleet, supplemented by 75 locomotives to be provided by Poland under agreements between States in Eastern Europe, will be adequate until about 1970, by which time steam power will have been eliminated. After 1970, it is estimated that about 70 per cent of lines will be electrically operated and 30 per cent worked by diesel power.

Continental Car Ferry Centre

THE new Continental car ferry centre which was opened at 52, Grosvenor Gardens, London, by Sir Philip Warter, Chairman of the Southern Area Board, British Transport Commission, last Monday is confidently expected to stem the growing avalanche of correspondence by dealing with most inquiries by telephone and so reducing delays. The centre will handle bookings for motorists and their cars on all the railway shipping routes across the Channel, and for the car-sleeper trains from Boulogne and Ostend. It has been set up by British Railways jointly with the French National Railways, Belgian Railways and Marine, and the A.A. and R.A.C. Representatives from all these organisations will be on regular duty in the centre. The growth in Continental cross-Channel traffic has been phenominal. In 1948, when British Railways introduced the first drive-on, drive-off, car ferry the total of motorists who took their motorcars across the Channel was under 42,000 : 10 years later the figure was more than 200,000. So far this year nearly 250,000 motorists have taken their cars across on the Anglo-French routes and by the Belgian Marine ferries between Dover and Ostend.

Asbestos Cement Sleepers

IN the early years of this century, an Italian engineer, Ing. A. Mazza, became interested in the durable properties of a mixture of asbestos fibre and cement. Ing. Mazza had railway experience, and he developed the idea of an asbestos cement railway sleeper over 20 years of experiment also connected with other work in asbestos cement. The result can be seen today on the Continent and in Scandinavia. Ing. Mazza had considerable early difficulty in finding a railway system which would give serious consideration to his new sleeper, and it was not until 1937 that it received its first practical test near Frugarola on the Genoa-Turin line of the Italian State Railways. Since that date, lengths have been laid in the international trial tracks in Holland, and the sleepers incorporated in German, Finnish, Mozambique, and Venezuelan railways. The manufacturer is Eternit S.P.A. of Genoa, Italy, of which company Ing. Mazza was President until his death in 1956. This company, which has world-wide representation, is contemplating an expansion of its capacity.

Improvements to Vehicle Washing Plant

LONDON Transport has developed a system of bus washing which, in a garage of 100 vehicles, saves the labour of six men, two more than are saved by the use of most existing washing machines when compared with entirely manual labour. A description of the prototype machine for the new system installed at Harrow Weald, and to be standardised at other garages, is given elsewhere in this issue. The chief point of interest to railway operators is the use of a photo-electric cellto detect the entry of a vehicle and to control the working, in sequence, of all water sprays and brush motors. The suspended box frame machines currently used by London Transport have a maximum throughout of 30 vehicles an hour. The achievement of this rate, which is insufficient for many garages, requires considerable skill by the operating staff. Several alternative designs to increase speed and efficiency have tended to be too high in first and maintenance costs. London Transport is undertaking a programme of research into the abrasiveness and wear rate of fibre and nylon as materials

for rotating brushes used at varying peripheral speeds with the object of making further improvements to the new machine in future.

The Recognition of Railway Enthusiasm

AT the Diamond Jubilee Dinner of the Railway Club last Saturday, it was announced that membership stood at the highest figure for half a century. This fact, and the enthusiasm of a noteworthy gathering, provide a salutary rejoinder to the jeremiads of those who now think of railways as being in their death throes, and for many years have been proclaiming that standardisation, grouping, nationalisation, and the like, are destroying popular interest in what is still the backbone of our transport system. As we mentioned editorially last week, the Railway Club is the pioneer railway enthusiast organisation, and from it has stemmed a series of specialist societies, first in Great Britain—the country of origin of the special popular interest in railway matters—and, between the wars, in many other parts of the world. Railway officers present, both members and visitors, indicated their appreciation of the goodwill value which they place on informed public opinion. Sir John Elliot, the principal guest, recalled many amusing incidents from his own railway career, which began some 35 years ago when he migrated from Fleet Street to become the pioneer railway P.R.O., and, we may add, an outstandingly successful exponent of the art.

Expansion in Australian Steel Production.

THE fact that Australian firms in collaboration with American concerns are now not only turning out diesel locomotives and railcars for home use but also for export is common knowledge, but the magnitude of Australia's steel capacity is not so well known. In the year 1958-59 the Broken Hill Pty. Co. Ltd., produced nearly 3,200,000 tons of steel ingots from its various plants. This out-turn was no less than 54 per cent higher than that in 1957-58, though only 30 per cent greater five years ago. This remarkable increase is mainly due to the additional open-hearth plant at Port Kembla. Moreover the Western Australian rolling mill at Kwinana is now not only meeting the entire demand in that State but the greater part of its output is going to other States. In addition, great extensions are in hand at Whyalla in South Australia and at Newcastle and Port Kembla in N.S.W. At the former the blast furnace is being enlarged and a rolling mill is to be built.

Stock for New Electric Services

THE placing of contracts with British Railways workshops for 648 electric train vehicles at a cost of £10,000,000 marks a further stage in the implementation of British Railways electrification programme. The vehicles have been ordered by the British Transport Commission in readiness for the introduction of new electric train services in the North West, North East London, and Kent, and are to be built in the railway workshops at Doncaster, Eastleigh, Wolverton, and York.

For the electric train services to be introduced in the Eastern Region in September next, between Liverpool Street and Enfield, Chingford, Hertford East, and Bishops Stortford, 232 vehicles are to be built, 76 of them at Doncaster works and 156 at York. The vehicles to be built at York will form 52 three-car train sets for the Enfield and Chingford services, and those from Doncaster will comprise 19 four-car trains for the Hertford East and Bishops Stortford lines. Electric trains on the Enfield and Chingford lines will consist of six or nine cars, made up of two or three three-car sets, and on the Hertford East and Bishops Stortford services eight-car trains will run between Liverpool Street and Broxbourne & Hoddesdon where most of them will be divided.

Electric trains are also to be introduced in the London Midland Region September next, between Manchester and Crewe, and 60 electric vehicles to form 15 four-car units are now being built at Wolverton works for this service. A further 80 electric train vehicles have now been ordered to form 20 four-car units, and these will be built at Wolverton next year for the Liverpool-Crewe service. Conversion of the Manchester-Crewe line to electric traction will complete the first stage of the electrification of the main line from Euston to Birmingham, Liverpool, and Manchester. By concentrating all available resources upon this main line it is hoped to complete its electrification by 1964, some three years earlier than was originally planned.

Electric train services were extended in the Southern Region from Gillingham to Ramsgate and Dover in June this year, when the first phase of the Kent Coast electrification scheme was completed. Work is in progress on the second phase of the scheme, which it is hoped to complete by June, 1962, when all main lines in Kent will be electrified. This second phase will project electrification from Sevenoaks and Maidstone via Ashford to Folkestone and Dover. For these services 336 electric train vehicles are to be built by the Eastleigh works; 236 of them as 59 four-car sets of which 10 sets will include a buffet, and 92 as 46 two-car units. The remaining eight vehicles will be self-propelled electric luggage vans.

Apart from normal passenger services on these lines, all boat trains to and from London, with two exceptions, the "Golden Arrow" and the "Night Ferry," will also be operated by the electric multiple-unit trains. The electric luggage vans can be attached to these electric trains to provide additional baggage accommodation. These luggage vans have their own electric motors, can be driven from driving compartments at either end as independent vehicles or as the driving vehicle of an electric train, and on non-electrified lines and sidings can move under their own power supplied from electric storage batteries. The luggage vans may also be used as light locomotives and have a hauling capacity of almost 100 tons when working on battery power.

The Locomotive and Rolling Stock Industry

COMMENDABLE enterprise has been shown in the co-operation between the Government, the Locomotive & Allied Manufacturers' Association, and the British Transport Commission in the production, and distribution in many countries, of the film "British Locomotives," publicising the achievements and potentialities of British locomotive builders. Brief reference to the film was made last week. Production was by the Central Office of Information, which is to be congratulated on a film both more imaginative and practical than some of its previous films.

The choice of the nine languages for the commentary is determined by the actual and potential markets for British locomotives and by the extent to which English is very largely the working language on railways in a good many countries such as Burma, India, Malaya, Pakistan, and states and territories of the British Commonwealth in East and West Africa. The languages are: Arabic, Afrikaans, English, Finnish, Persian, (Brazilian) Portuguese, Siamese, (Latin American) Spanish, and Turkish. The choice of Asian languages means that a very wide area of that continent is covered. The film is to be distributed in practically every country where there are railways.

The interest of the Government in the venture was stressed by the presence at the special showing of the film at the Savoy Hotel, London, last week, of two Ministers, Dr. Charles Hill, Chancellor of the Duchy of Lancaster, who is responsible for the activities of the C.O.I., and Mr. Ernest Marples, Minister of Transport. Sir George Nelson, President of the L.A.M.A., who was in the chair, rightly emphasised the importance of the contribution to the export drive made by the locomotive industry of Britain, in sales of its products overseas, and of the need for the support of the home Government and of the home railways to enable this to continue. This is a truth which cannot be over-emphasised. Whilst he praised the efforts of the Board of Trade on behalf of British exporters, he pointed out that there was no room for complacency, as shown in the recently published Report on Export Trade Facilities. "From time to time," Sir George Nelson stated, "I feel we shall have to seek further help from the Government, particularly in connection with the financing of overseas projects."

As to collaboration between British Railways and the British locomotive, and indeed the carriage and wagon and signalling equipment, industries, the plan for modernisation and re-equipment of British Railways is a great opportunity not only for the nationalised railways, but also, as Sir George Nelson has stated, for the firms which supply them and railways overseas with locomotives and other material. Implementation

of the plan is providing these concerns with a home market which is essential as a basis for exports. This home market nevertheless could be considerably greater. Every industry, if it is to export successfully, needs a stable and assured home market, not only to ensure a continuous flow of production, which is vital to achieve competitive costs and therefore competitive export prices, but also as a shop window for its products. The achievements in the export field of the motor-car and heavy electrical engineering industries have been spectacular. The success of the electrical industry in export markets springs from the support it receives from the nationalised power supply industry. The locomotive industry, Sir George Nelson states, is grateful to the British Transport Commission for the opportunity to participate in the modernisation programme. It is also fully cognisant of the need for the utmost technical and general collaboration with British Railways. Such collaboration and the related pooling of technical knowledge, he maintains, is already well established and will no doubt be extended further as the modernisation plan develops. This is of inestimable benefit. He has expressed the hope that it may lead to the production for export of proven British Standard locomotives which will keep Britain in the forefront of technical progress.

The help being given to railways in countries in Asia which are members of the United Nations Economic Commission for Asia & the Far East by the British Government through the newly formed United Kingdom Railway Advisory Service was the subject of comment in our October 23 issue. Much credit, Sir George Nelson points out, is due to the Ministry of Transport and to the B.T.C. for their leadership and support of this important organisation. The Commission is helping by arranging to supply, when asked by the U.K.R.A.S. organisation in London, the answers to questions affecting the various spheres of railway activity, and Mr. John Ratter, the Member of the Commission concerned with technical matters, is charged with ensuring liaison between U.K.R.A.S. and the headquarters and departments concerned of British Railways. The fact that so senior an official of the nationalised transport undertaking has undertaken this duty shows the importance attached to it by Sir Brian Robertson, Chairman of the Commission, and his colleagues. British manufacturers of railway material also are to be congratulated on placing their knowledge and experience and, if need be, the services of their staff, at the disposal of the Advisory Service. Another way in which the Commission is helping British railway industries, and those concerned with railway electrification, is the convening by the Commission of the British Railways Electrification Conference, 1960, to be held in London next October. Reference to this has been made in several recent issues.

The Government has shown constructive statesmanship in creating, and the Commission in supporting, U.K.R.A.S., as a means of strengthening the economic position of the less economically developed countries of Asia. It is to be hoped that the Government, and the nationalised transport undertaking, will show the same awareness of realities in treatment of the industries in Britain which supply railways at home and overseas. The need of the rolling stock industries for a steady home market is great. The nationalisation of privately-owned wagons, which were formerly built by private manufacturers, has been a severe loss to the British wagon-building industry, for only a relatively small—and, it has been stated, decreasing—proportion of British Railways' new wagons is being obtained from private builders. It is in this and similar respects that the Commission must bear in mind its responsibility to the railway material industry as a factor in national prosperity. Decisions by the Commission as to policy in obtaining railway material are vital in that they determine the extent of virtually the whole market for railway material in Great Britain. Before nationalisation, builders, if unsuccessful in obtaining orders from one of the four main-line railway companies, or the London Passenger Transport Board, could turn to another; and indeed for many years before grouping in 1923, whilst the railway industries were developing, the number of companies was much greater. Now a decision of the Commission affects all railways.

The new Minister of Transport, with his experience of directing a large-scale business enterprise in the sphere of engineering, may be expected to view the problems of the railway industries with sympathy and represent them to the Government accordingly. The matter is to be debated in the House of Lords on December 17. These are questions of national welfare which need to be ventilated at the highest level. It is to be hoped that prompt and decisive action to assist the British railway material industries will follow.

Safety Organisation on the C.N.R.

MANAGEMENT leadership in the sphere of the safety of the railwayman is the theme of an address by Mr. J. C. Kenkel, European General Manager, Canadian National Railways, to the Birmingham & District Industrial Safety Group. His talk included much information on the organisation for industrial and other safety, as opposed to safety in connection only with train movements on the C.N.R. Part of Mr. Kenkel's experience with his company before coming to Britain some two years ago to take up his present appointment afforded an opportunity of looking at the safety problem from a somewhat different angle than that of the railway safety officer daily engaged on such work.

The Canadian National Railways organisation, he explains, has a Senior Safety Officer at head office in Montreal and in each one of the five Regional territories in Canada and the U.S.A. Below these are safety officers spread over the system across Canada. A few years ago these reported direct to the Senior System Officer at Montreal, but it was felt that it would be more effective if line representatives reported directly to the functional officer in charge of a territory or shop. This change was made, enabling the System officer to concentrate on policy and introduction of new techniques into the accident prevention programme. The System Safety Officer reports directly to the office of the Vice-President at head office in charge of all operations. Super-imposed on this organisation is a Safety Council, consisting of the System Safety Officer, each of the five Regional safety officers, officers of transportation (operating), engineering, and mechanical departments, with representatives of labour unions with a direct interest in those functions, the Chief Medical Officer, and so on. As Assistant to Vice-President of all operations, Mr. Kenkel was chairman of the Safety Council, which met twice a year to discuss performances and future policies. As to accident prevention in the field, the managerial level was required (1) to act as a medium between the Senior System Officer of Safety & Management; (2) to direct inquiries from managerial level to territories or shops where the safety performance was considered unsatisfactory; and (3) to keep abreast of general safety trends so that new techniques could be incorporated into the programme.

Because any safety programme depends on healthy employees, applicants for appointments on the C.N.R. receive a pre-employment physical examination and, where necessary, intelligence and aptitude tests. Train crews and certain other staff must pass medical examinations including vision, colour-sense, and hearing tests every two years. The role of management in this educational work for safety includes provision of adequate safety rule books covering various departments, and manuals dealing with maintenance and inspection services. The C.N.R. makes extensive use of audio-visual education methods such as motion pictures, special slides used in lectures, and railway coaches working over the system specially equipped with exhibits and showing cinematograph films. Wherever possible instruction is given close to employees' home stations. Three films were produced by the C.N.R. and the actors were railway staff. One film deals with operating, another with permanent way maintenance, and the third with production in mechanical workshops. All lectures and other instructional material are channelled through the supervisory officers of the departments involved. This emphasises the necessity of leadership throughout the supervisory grades, with the members of the Safety Department acting largely as liaison officers. Operating and safety officers, Mr. Kenkel observes, must be more alert than ever to offset the increased hazards which are created by this faster pace of work. For instance, the change from various types of train operation written orders to signalling systems has meant that staff must be thoroughly trained well in advance of the introduction of such a technical improvement.

In the provision of adequate safeguards for modern devices, and in the extension of safety equipment generally, it has been found that co-operative meetings between C.N.R. employees and supervisors prove most helpful. The man who actually

handles equipment and performs the work can frequently offer suggestions for improvement which might be overlooked by anyone not so closely involved. The suggestions scheme has produced some fruitful safety proposals.

One effective way of ensuring that all staff is conscious of the importance of accident prevention is for all officers, including the President, to refer to the importance of accident prevention whenever they have an opportunity of speaking to employees. The safety officers have received excellent support in that direction, and know its value and the encouragement which it gives to those concerned with safety. For instance, when the President of the C.N.R., Mr. Donald Gordon, assumed office in 1950, the injury ratio of the railway was 24 per cent. This ratio is based upon an injury whereby the employee loses more than three days within the first 10 following the injury. Accident prevention measures were in force before 1950, but they received a great impetus through managerial leadership under the present C.N.R. executive. Mr. Gordon challenged those immediately concerned with accident prevention to effect an improvement. He gave personal support to his challenge and his vigorous approach through all levels of responsibility was such that an awakening took place and senior officers became completely conscious of the need for substantial improvement. This interest of management in accident prevention has resulted in a consistent decrease each year, so that in 1958 compared with 1950, the accident ratio improved from 24 to 8 per cent.

Another part of the current programme is to hold an annual family safety night at many points across the country, which has proved most beneficial. These are social rallies at which a safety message is presented as part of the evening's entertainment. Attendance by employees and their families is reported to be most encouraging and the overall response enthusiastic. Territorial officers are present, and the guest speaker is usually a man prominent in local affairs.

The safety officer must be, in essence, a crusader. Without missionary zeal, he is only too liable to feel that he is in a relatively remote tributary of a rushing river. Mr. Kenkel feels that it would be better in every way for both industry and the individual if appointments as safety officers were regarded as stepping stones to higher positions. When a young man of special promise is discovered, he suggests, the management might be well advised to immediately chart his career so that at some stage of his progress up the ladder he would be assigned to a post in the safety department, if even for a short period. He would thus be exposed to as critical a problem as he would likely have to deal with in future positions of responsibility. On the C.N.R. it has been found that the personal concern of senior officers in accident prevention results in the torch flaming throughout the organisation. Their influence might be even more profound if their interest in the cause of safety could be fuelled by actual experience, which must result in an instinctive appreciation of its importance.

Columbia River Dam and Bridge

THE Columbia River, there flowing from east to west, passes the important city of Portland, Oregon, with a population of 450,000, about 150 miles from its mouth or 60 miles as the crow flies from the Pacific Coast. Some 90 miles upstream from Portland the Dalles Dam was recently constructed heading the river up to a depth of 90 ft., and raising the maximum high water level by about 4·2 ft. at a point 10 miles above the dam. The main line of the Spokane, Portland & Seattle Railway, running along the north or right bank of the river, is joined at Wishram, 10 miles above the dam, by the Oregon Trunk Railway, which it owns and works. The O.T.R. comes in from the south and so has to cross the Columbia to reach Wishram Junction, the bridge being known as the Celilo Bridge; it carries a single railway line.

This is a remarkable structure, Y-shaped in plan, with an overall length of about 4,170 ft. (8/10 of a mile) including both arms of the Y. Before the raising of the maximum river level by the dam, it consisted—from south to north—of five plate-girder deck approach spans each averaging about 75 ft. in length, a 250-ft. asymmetrical swing-span providing a canalised navigation opening of 134 ft., a fixed through truss 320-ft. span, six more through truss spans each of about 230 ft., and 17 102-ft. plate-girder deck spans, eight being in the western and nine in the eastern arm of the Y. Another unusual feature was that the entire bridge was built not only on a 12½-deg. skew, but also on a 1-in-200 gradient falling towards the two northern abutments. With the raising of the water level the girders of the spans resting on these abutments would have been submerged. Proceeding southwards up the gradient it was not until No. 8 main pier, between the fourth and fifth 230-ft. spans, had been reached that the original spans were sufficiently high to provide adequate headroom over the then-proposed new water level.

Accordingly, it was decided to raise the 102-ft. girders at the north abutments by 5 ft. 6 in. and provide a level gradient from that point to Pier 8 by gradually tapering out the raising over each pier from 5 ft. 6 in. to zero. From Pier 8 southwards the 1-in-200 rise was to be, and is now, resumed. This raising was carried out under traffic as described in an article on another page. Also described are the measures taken to improve the bridge from the navigational point of view.

With the creation of a deep-water permanent pool or reservoir the swing-span ceased to be located in the correct position for navigation, now diverted to the main channel passing under the 320-ft. span. The swing-span also had too small an opening. In fact, before the construction of the dam, the reach of the river on which the bridge is situated was known as the Celilo Falls, the bridge piers being founded on dry rock with rapids around them when the river was not in flood. To enable boats and barges to go up and down the river they were diverted into what was known as the Celilo Canal, passing through the larger opening provided by the swing span. To enable the river traffic to use the main channel it was necessary to convert the previously fixed 320-ft. span over it into a lift-span. One of the principal reasons why it was decided to use tower-drive instead of span-drive machinery for this converted span was that it was not only on a skew and on a gradient, but was also pin-connected. The modification of this span is described in the article.

Keeping a Branch Line Open

OPERATION of diesel railcars has improved the financial position of a good many branch lines by attracting traffic to the faster, more comfortable, and often more frequent service and by reducing working costs compared with those of steam trains. Even after such improvement there is still a loss on passenger services on many branches. It has been suggested on several occasions recently that to justify continuance of an otherwise unremunerative passenger service, those who use it should contribute to the higher working cost by paying more than the usual fare.

This principle is being applied in part and as an experiment on the 13-mile Haltwhistle-Alston branch of British Railways, North Eastern Region. In an attempt to avoid withdrawal of passenger services, the Region has not only substituted an improved service of diesel for the existing steam trains, but has suspended the cheap day return fares formerly in force as between Haltwhistle and Alston, including intermediate stations. This means that passengers travelling on the branch pay ordinary single or return fares based on the new rate of 2¼d. a mile second class. Reduced fares in operation with stations off the branch have been adjusted to embody the ordinary fare for that portion of the journey which is made over the branch. As the mileages from Alston to Newcastle-on-Tyne and Carlisle, for instance, are respectively 51 and 37, passengers on, say, shopping excursions do not pay much over and above what would be the cheap day fares if these were based on reductions over the entire distances. They certainly enjoy a better service. Apart from the advantages of the diesel railcars, there are two additional trains each way more than in the former Monday to Friday service, making six each way, and the Saturday service is increased by one additional service from Haltwhistle to Alston. Most of the trains between Haltwhistle and Carlisle and Newcastle are diesels on fast schedules.

The principle of charging a higher rate for an unremunerative service in this case is applied only negatively. Strictly, this is equitable. Against this there is the conception of the branch line as a feeder, of which the expenses should be borne by the whole system. Public reactions to the experiment on the Alston branch are being watched with interest.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of Correspondents)

New Method of Design Calculation

November 24

SIR,—I was very much interested to see the comment and correspondence in your October 23 and 30 and November 13 issues on the use of the matrix force method of structural analysis for rolling stock design.

The Research Department of British Railways has realised the uses of this type of analysis, and has in fact used the basic method for the stress analysis of an all-steel bridge. The dual theorem, matrix displacement method, has been used rather more by the Research Department, particularly in the solutions of plane frameworks. A recent design of wagon underframe has been analysed using the displacement method.

Both methods have formed a large part of the planned research into the use of digital computers in structural analysis, the Department being particularly fortunate in having its own digital computer.

With regard to the use of a matrix force method for coach design, if it were decided that an aluminium coach of integral construction was required, one in which the main longitudinal loads were dispersed through the body and not confined to the underframe, then I would agree with your correspondents that the only satisfactory way of providing a comprehensive picture of the possible structural behaviour of the coach would be to formulate a theoretical design study. A matrix force analysis would seem to be the best way to accomplish this. However, since the main principle of the method is that the entire structure be split mathematically into the individual elements that comprise the structure, and a specified behaviour assumed of each element, I would add that component structural testing would be essential at every stage of the analysis to ensure that the behaviour associated with an element is in fact the true behaviour.

Some of this information could doubtless be obtained from the Royal Aeronautical Society data sheets, but I suspect that some of the members, such as the shear panels, in a coach design will be outside the range covered by these data sheets.

I look forward to the Joint Symposium to be held on May 27, 1960, by the Institution of Locomotive Engineers and the Aluminium Development Association, for the spread of knowledge of this type of calculation.

Yours faithfully,

P. J. COATES,
Senior Scientific Officer

British Transport Commission,
Research Department, London Road, Derby

L.M. Region Main-Line Services

November 22

SIR,—When electrification is completed we should be able to see an excellent and competitive service over the Western Division main lines of the London Midland Region. Yet a speed of 65 m.p.h. over 193½ miles from Euston to Liverpool with a powerful electric locomotive is going to compare very unfavourably with 67 m.p.h. over 268 miles with a Gresley Pacific locomotive nearly 30 years before.

From the purely practical angle a frequent and punctual service at 65 m.p.h. is probably all that can be justified economically, but if we accept that where there is virtually no limitation on locomotive power, what sort of standard are we to expect where such limitations are very real ?

The output of the L.M. Region 25-kV electric locomotives is 3,300 h.p. at the continuous rating. Short-term rating is much higher. By comparison, taking transmission efficiency as 80 per cent, British Railways English Electric Type "5" "Deltic" diesel-electric locomotive develops 2,640 h.p., and the "D800" series diesel-hydraulic locomotives of the Western Region 1,830 h.p. at peak rating and so on, down the scale to the great mass of the Class "2" diesel locomotives, which are of less than 1,000 h.p.

Failure to appreciate that the useful power of a diesel locomotive is not the same as the brake output of its diesel engine appears to extend quite a long way up among the top brass of the British Transport Commission, and may account for the almost desperate attempts to boost the output of so many classes after prototype trials.

Yours faithfully,

L. IRVINE-BROWN

Ivydene, Tilston, Malpas, Cheshire

[Motive power is not the only factor determining speed. Line occupation is another. It is understood that services over the L.M. Region electrified main lines will be on a regular-interval basis. Until more is known of plans, including the weights of trains, the type(s) of electric locomotive, and number of stops, criticism serves no purpose. The weights of the L.N.E.R. "Coronation" and "Silver Jubilee", which in 1939 were covering the 268 miles between Kings Cross and Newcastle in 3 hr. 57 min. and 4 hr. respectively, are given officially as 312 and 248 tons tare.—ED., *R.G.*]

Selection and Training of Railway Staff

November 20

SIR,—Although Mr. H. C. Johnson stated in his address to the Railway Students' Association that "... it is the first and most important duty of every man who controls staff, from the General Manager downwards, to take a live personal interest in the selection, training and development of the people in his charge," he introduced an element of uncertainty with the last sentence of his letter in your November 20 issue: "There must be a close personal interest at all levels of Regional management; if there is, we shall secure the men we want."

May I ask him, in his position of General Manager of British Railways, Eastern Region, in what way does he satisfy himself that his policy is being carried out? Can he produce evidence that every man, irrespective of age or grade, and whether he has applied for promotion or not, is being systematically considered at certain intervals for suitable promotion, or dealt with otherwise, and that no individual has been overlooked? If not, his scheme cannot be considered to be effective or to be efficient staff relations.

Yours faithfully,

ROBERT W. LEWIS

Beth-el, 104, Leggatts Way, Watford

Branch Line Closing

November 26

SIR,—Outside Huddersfield the Holmfirth branch has just been closed to passenger traffic, despite considerable opposition. Events followed a now too familiar routine. The Area Consultative Committee seemed to have a bias in favour of the British Transport Commission rather than the railway user's point of view.

The public in the area is resentful at being deprived of the service and at having been over-ridden, and there is loss of civic status when one's town's name ceases to appear in *Bradshaw*.

Not enough imagination has been brought to bear on this problem. Would it not be possible for the Commission to say that lines will be kept open to passenger traffic if the local community is prepared to pay an agreed annual sum to balance the working loss? If this was put on to the rates it would be a real incentive to the people using the line more often. If the local authority made the decision a matter for a referendum, British Railways would avoid the odium of having closed the line in the face of opposition, and would be protected against financial loss.

Yours faithfully,

WILLIAM B. STOCKS

22, Heatherfield Road, Marsh, Huddersfield

[The fact that the recommendations of the several Transport Users' Consultative Committees often, but not always, are in accord with the B.T.C. applications surely show the latter to be reasonable.—ED., *R.G.*]

THE SCRAP HEAP

Oxford Movement ?

The rector of St. Aldate's Church, Oxford, who is organising a petition which criticises the Oxford-Paddington train service, had copies placed in all the pews on Sunday, and over 500 worshippers signed.—*From "The Times."*

Cavemen

Nowhere do people behave as in London. There is something about a tube train—it need not even be packed—that brings out the jungle strain in men in particular. I have been punched, kicked, knocked off my feet, and even once . . . pushed over so that a man could take a vacant seat.—*From a letter from a lady to "The Evening News."*

Telephones in Trains

My diary records a telephone talk, which a friend and I had from a non-stop train between Berlin and Hamburg, on May 27, 1928. It was not a *train de luxe*. We both wore headphones, and had a three-cornered conversation with a resident of Potsdam. The cost was three marks (3s.).—*From a letter to the "Sunday Times."*

[Radio programmes could be heard on headphones available for hire in Hungarian State Railways trains in the early 1930s. These and other services in moving trains have long proved technically feasible but until recently had not been commercially successful.—ED., *R.G.*]

Privately Owned G.N.R. Tank Engine

A "J52" class saddle tank locomotive of the former Great Northern Railway, No. 1247, designed by H. A. Ivatt and built in 1899 has, after 60 years' active work, been acquired by Captain W. G. Smith, V.R.D., R.N.R. The locomotive is in working order and has been restored to its original livery. Housed in an industrial plant near Hatfield, it recently appeared at an exhibition in Peterborough alongside the L.N.E.R. Gresley Pacific *Mallard*, which in 1938 attained the then record speed of 125 m.p.h. and was a Kings Cross shed companion of No. 1247 in its working days.

Samuel Smiles Aged Ninety

Teixeira de Mattos, the Dutch translator, took me today to Pembroke Gardens to see Samuel Smiles, the author of "Self-Help." I thought he had died years and years ago. He is, in fact, nearly 90 years old, and very feeble. The old gentleman is more proud of the fact that he was once Secretary of the South Eastern Railway than of his literary efforts. He told me that he began life as a medical man in Scotland, but could not make a living, so he became Editor of the *Leeds Times*, and then a railwayman. He thinks George and Robert Stephenson were extraordinary men, also James Nasmyth.—*From the entry for December 6, 1901, in the diary of R. D. Blumenfeld ("R.D.B.'s Diary*, 1887-1914").

Quick Verdict

Mr. Justice Stable, who had a train to catch to fulfil an important engagement in London, called a jury back into court at Nottinghamshire Assizes recently, and said that if they could not reach a decision in 10 minutes they would be kept locked up all night until the hearing resumed next day. . . . The timetable of events was: 12.20 p.m., jury retired; 2.20, jury returned to ask the judge for guidance on two legal matters; 2.23, jury retired again; 2.40, judge called back jury and gave them his warning; 2.44, jury reached decision; 3.25 train, with the judge in it, left for London.—*From "The Daily Telegraph."*

Photo] [W. G. Smith

Former G.N.R. "J2" class locomotive now privately owned and repainted in original green livery

Shipwreck on the Railway

One of the most tremendous storms which ever hit the British Isles was that which culminated on Tuesday, October 25, 1859, and is known as the Royal Charter Gale. Through the night the storm had crossed the country, leaving a trail of destruction, and on the Tuesday morning tremendous seas battered the broad - gauge South Devon Railway between Exeter and Teignmouth. Rail traffic was suspended. Rails were washed out of position between Exminster and Turf. Several pieces of the wreck of a vessel were found on the line at Powderham. The embankment to Dawlish was broken. The name by which this famous storm is known was that of the Liverpool steam clipper, *Royal Charter*, of 2,719 tons, on the journey home from Melbourne. She was the most outstanding victim of the 133 ships which were total wrecks in the storm.—*From "The Times," of November* 27, 1959.

Conversion

(*With acknowledgment to R.K.*)

There's an old G.N. East Coaster in a siding by the line
With a first class saloon body and I wish that she were mine;
But the breeze blows from Headquarters and I heard some beggar say:
"Convert her to an office for our staff at Whitley Bay."
On the road to Whitley Bay how I wish I'd cash to pay
For that carriage for a chalet and a perfect holiday.
On the coast at Whitley Bay where the traffic wallahs play
And the strips tear off like thunder from H.Q. across the way.
With a bit of spit and polish her windows shine like stars;
Her suspension and upholst'ry are as good as any car's.
And if she looks old-fashioned because she's made of wood
Will the steel ones last like she does and end up half as good ?
For her body's made of teak, too well-built to "give" or creak
And she runs so quiet and smoothly you needn't shout to speak !
On the coast at Whitley Bay she won't just corrode away
She will last for bloomin' ever if they keep her varnish gay.
The Missus has some curtains; they'd have dolled her up a treat.
I'd have rigged some window boxes and a little porch complete.
But, having done her mileage and notched her miles per hour
She's got to be an office, a blooming maiden's bower !
On the road to Whitley Bay, forty years if she's a day !
Like Charley's Aunt, still running, why shouldn't she go gay ?
On the coast at Whitley Bay she will last till we are grey
And she'll still be an East Coaster when we're dead and put away !

G.C.N.E.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

EAST AFRICA

Kilosa—Mikumi Branch Line

Progress is being made towards the Great Ruaha River from Kilosa by East African Railways & Harbours with a new railway line which is helping to open up the new areas in Tanganyika. This new branch line will run the 44 miles from Kilosa on the Central Line of Tanganyika to Mikumi to transport the ever-increasing area of the fertile Kilombero Valley in which sugar, rice, and tobacco are being grown. The Governor of Tanganyika, Sir Richard Turnbull recently paid a visit to the project and to the alignment of a possible further extension from Mikumi to the Ruaha river. The Kilosa—Mikumi branch line construction is expected to be finished in mid-1960.

Mnyusi-Ruvu Railway Survey

The East African Transport Advisory Council and the Railways & Harbours Committees considered at their recent meetings among other matters a report on the Mnyusi-Ruvu railway survey. They were advised that the survey party placed in the field last July had to date completed approximately 28 miles of the survey from Mnyusi, along the proposed alignment of the connecting line between the Tanga and Central Lines in Tanganyika, and had carried out a detailed reconnaissance of a further 8½ miles. The survey had, therefore, covered the most difficult part of the line, which is the ascent from the Pangani River to the top of the escarpment and the descent to the coastal plain near the village of Tongwe. It was likely, therefore, they were informed, that, except in the unlikely event of any major difficulty occurring on the remaining 84 miles to be surveyed, the estimate of £2,000,000 already given for this rail link was a realistic one.

VICTORIA

Expenditure on Improvements

The Government Railways has been allotted £7,350,000 from the Loan Fund for expenditure during the current financial year on important suburban and country works, and for purchasing and building new rolling stock. About £950,000 will go towards suburban works, which must be completed before a start can be made on the construction of the proposed Melbourne underground railway.

Largest amounts are for the Richmond area project (£405,000); track duplication between Reservoir and Keonpark and extension of electrification from Thomastown to Lalor (£128,000); power signalling between Box Hill and Ringwood (£100,000); and a third track between Melbourne and East Camberwell (£80,000).

Progressive conversion to broad gauge and electrification of the Upper Ferntree Gully—Belgrave line, expected to be completed by the middle of 1961, will take £180,000. The allotment of money provides for £45,000 to be spent on a new station between Bentleigh and Moorabbin.

Duplication of the next section of the Geelong line, between Newport South and Laverton will be started. It is planned to spend £100,000 on this work. Completion of duplication and power signalling of the Trafalgar-Moe section of the Gippsland line will absorb £35,000.

A considerable sum will also be spent on improvements to rolling stock. More than £500,000 will be earmarked for the second order for 30 new suburban electric "Harris Trains." The first of these is expected to go into service early in 1961. Nearly £1,000,000 will be spent on the purchase of new diesel locomotives. During the year deliveries are expected of the balance of an order for 10 "T" class 900-h.p. diesel-electric locomotives, and the first 10 of 25 "W" class 650-h.p. diesel-hydraulic shunting and yard switching locomotives. When these new additions to the diesel fleet go into service it will be possible to make further reductions in steam locomotive operation and effect substantial economies.

NEW ZEALAND

New Ballast Wagons

The first batch of 40 of 200 new "Yc" class ballast hopper wagons on order from railway workshops were completed between June and September, 1959, at the East Town Shops, Wanganui. A prototype wagon of this new class was turned out by the Hillside Workshops, Dunedin, in 1958, so that there are now 159 to be built.

These new wagons are constructed on the new standard wheelbase of 13 ft. and measure 22 ft. 6 in. over buffers. Each wagon can carry 11.2 cu. yd. of ballast, compared with the 5.7 cu. yd. of the older "Yb" class, which is 17 ft. 6 in. long on an 8-ft. 6-in. wheelbase. The new "Yc" wagons weigh approximately 6 tons 15 cwt. each, compared with about 5 tons for each "Yb" class.

Reduced Family Fares

A reduction in prices for family tickets was announced recently by the Government Railways. It is now possible for one or both parents to travel with all their children under 16 years of age by railcar or express train, second class, for the price of only two-and-a-half ordinary return tickets. Formerly the family ticket cost three times the ordinary return fare. Seats can be reserved for all members of the family at no extra charge.

Auckland-Frankton Duplication

Duplication of the greater part of the 84-mile railway between Auckland and Frankton was completed on November 1 when a new double-line bridge over the Whangamarino Stream south of Mercer was brought into use. This extends double-line working a further 1½ miles southward from Auckland to a point south of Amokura, 45.3 miles via Newmarket, or 47.5 miles via Orakei.

Instead of duplicating the remaining short section (7.3 miles) of single line across the Whangamarino Swamp between Amokura and Te Kauwhata, it was recently decided to install C.T.C.

Diesel Operation in Israel

Photo] *[K. Wescott Jones*

A General Motors diesel-electric locomotive hauling a train of former Palestine Railways rolling stock, Israeli Railways

signalling equipment. This installation, to be operated from Mercer, will probably be completed early in 1960. Completion of duplication across the swamp would cost about £100,000 more than C.T.C., with no corresponding advantages. The use of C.T.C. in conjunction with a long crossing loop at Whangamarino would give ample capacity for heavy traffic for many years to come.

Level Crossing Survey

A survey of all level crossings in New Zealand was recently completed, the objects being to review the signposting and warning devices, ascertain whether views could be improved, and revise the list of priorities for provision of warning lights and bells. A railway engineer investigated each of the 2,200 or more crossings on the spot. He was accompanied by representatives of the Transport Department, the National Roads Board, the Automobile Associations, and the local authorities.

Following the survey, the views from the road of approaching trains will be improved at many crossings, and changes will be made in the arrangement and positioning of some signs.

TURKEY

Extension of Telephone System

The Turkish State Railways has made arrangements with the German Telefunken concern for the provision of a large extension of telecommunication facilities, to be modelled on the lines of those found on the German Federal Railways, whose engineers will act as consultants when required. Overhead line circuits are to be used and not cables and over 3,000 miles of railway route are involved; 12-channel carrier-wave equipment, delivery of some of which has begun, is to be used to obtain maximum circuit facilities. The whole scheme will take some years to complete. Some parts of the routes are broken by train ferry communication where wireless or other methods of bridging the gaps will be called for. Teleprinter services will be used as required. To establish some absolutely essential communication links between the general and divisional managements and other important locations a short-wave wireless system is being set up.

UNITED STATES

Longest Vertical Lift Span Bridge

For more than 70 years the railway between Staten Island and New Jersey has been carried across Arthur Kill in New York Harbour on a centre-span swing bridge 496 ft. long. In recent years it has proved of increasing inconvenience to the growing tanker shipping traffic to New Jersey refineries, as the average size of tankers has grown from about 15,000 tons to some 35,000 tons. Work was begun in 1956 on a vertical lift bridge in replacement, and this was opened on August 25, 1959. The new structure has a centre span 558 ft. long, suspended from two 215 ft. steel towers. This span weighs 2,000 (American) tons, and was floated into position on May 31, 1959. It can be raised to a maximum height of 135 ft., or lowered to its closed position 31 ft. above mean high water, in two min. Because of the heavy marine traffic, the bridge will be open normally, and lowered only for a train to cross. The old bridge, now demolished, was restricted to 50-ton cars, but the new one accommodates 70 ton vehicles. This new structure, erected at a cost of $11,000,000, is believed to be the longest railway vertical lift span bridge in the world. It is operated by the Staten Island Rapid Transit Railway, a wholly-owned subsidiary of the Baltimore & Ohio Railroad.

FRANCE

S.N.C.F. Freight Rates

The S.N.C.F. has confirmed that, with the aid of electronic equipment, it is working out a new method for the calculation of freight rates, which will differ radically in some respects from the system now in force. It is understood that the station-index weighting system will disappear, but that mileage over different sections of line will be subject to the application of a weighted coefficient varying according to the characteristics of the line. Thus, chargeable distances between two points may be higher or lower than the actual mileage.

Tray Service in Trains

The International Wagon-Lits Company is providing, on an experimental basis, in certain S.N.C.F. trains, a new tray-type meal service. This consists of a plastic tray, divided into sections, on which a complete three-course meal can be served to passengers in their own compartments. The meal comprises hors-d'oeuvres, main meat or fish course, and cheese, pastry or fruit, together with two rolls. Wines or other beverages can also be provided.

U.S.S.R.

New Moscow Underground Line

A new line, 1¼ miles long, of the Moscow underground was opened to traffic on November 7. It connects Kutuzovskaya Station with Studentcheskaya Station and ends at Fili Station. The three stations are built entirely of glass, metal, and prestressed concrete, and the whole of the line is a surface route.

Publications Received

Polypenco Nylon.—The engineering properties and uses of Polypenco Nylon 66 are described in a brochure published by Polypenco Limited, 68-70, Tewin Road, Welwyn Garden City, Herts. Properties include lightness, toughness, resilience, and resistance to chemical corrosion. It is claimed also that Polypenco Nylon 66 is suitable for use at much higher temperatures than the majority of plastics and that it is a good high-voltage insulator although it is not usually suitable for high-frequency low-loss applications. The brochure illustrates a selection of gears, bushes, bearings, thrust washers, wear strips, and other components manufactured from this material. Many standard sizes of nylon strip, plate, tubing and tubular bar, and round, square, and hexagon rod are listed as raw material for manufacturing purposes. There are dimension tables for stock nylon thrust washers and a list of suggestions for other parts such as screws, bolts and nuts which can be fabricated from nylon to customers' requirements. Braided and plain nylon pressure hose, also is listed in the brochure. Other polyamide resins made by Polypenco Limited are described and their several advantages discussed.

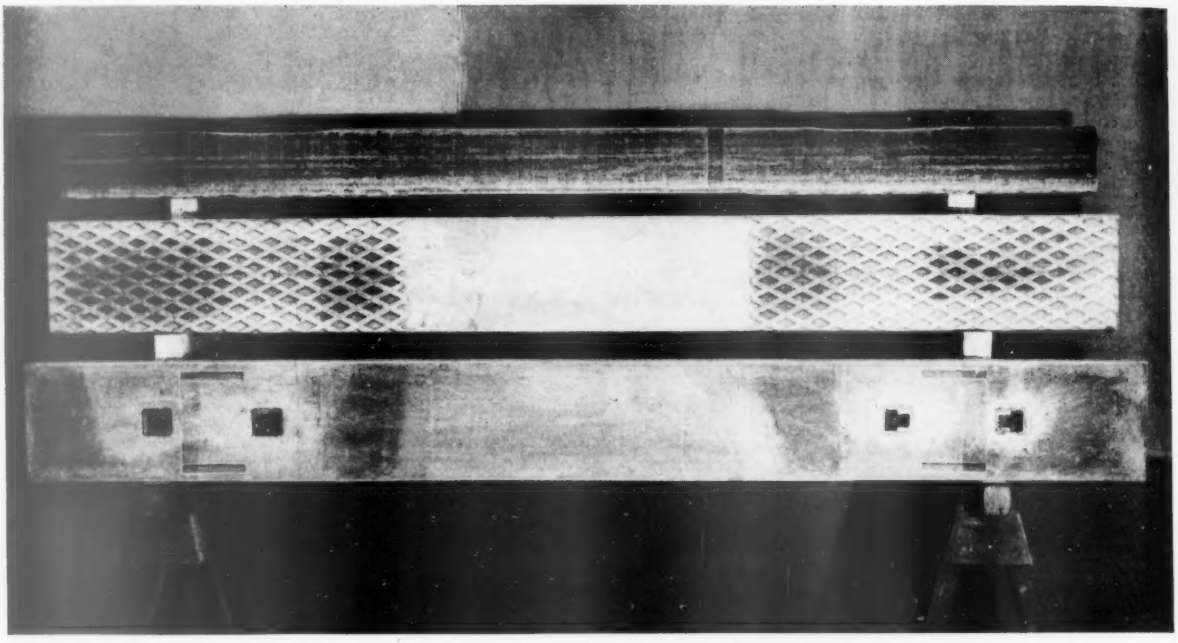
Auto-Klean In Industry.—A brochure published by Auto-Klean Strainers Limited describes the comprehensive range of filters manufactured by this company. Forty pages of descriptive matter are intended to assist designers and maintenance engineers to select the most suitable unit from the many sizes and types offered. The majority are self-cleaning filters requiring only a turn of the handle to revolve the plates against the cleaner blades and so to remove accumulated solids into a large-capacity sump. Illustrations clearly show the principle of working. The fluids handled range from water to high-viscosity resins, from liquefied gases to high-temperature steam, and from liquids under vacuum conditions to high-pressure hydraulic oils. As examples of the extent of applications, 180 fluids are named and so are 43 different types of plant requiring filtration, including internal combustion engines, fuelling installations, and machine tools. Tables show pressure losses in pipes for viscous flow of oils, and viscosity conversion. Copies are available from Auto-Klean Strainers Limited, Lascar Works, Hounslow, Middlesex.

Clyde-Booth Hydra-Luff Cargo Cranes.—A brochure describing Hydra-Luff level luffing cargo cranes which feature hydraulic luffing of the jib, has been published by Clyde Crane & Booth Limited. Details of the hydraulic power unit and of the double-acting cylinder and ram are given; also the patented hydraulic system is shown schematically. Five alternative methods of obtaining level luffing motion commonly employed by this manufacturer are explained by clear diagrams with notes on the advantages of each. Dockside cranes featured in the main illustrations, handling railway container traffic and so on, obtain level luffing motion by the simple and efficient Toplis system, but the Hydra-Luff is not limited to this type. Copies may be obtained from Clyde Crane & Booth Limited, Mossend, Bellshill, Lanarkshire.

Railway Sleepers in Asbestos Cement

A brief description of asbestos cement sleepers, the method of manufacture, characteristics and present usage

By W. Hubbard



Side, base, and plan views of asbestos cement sleeper, showing bushings for rail fixing bolts

THE advancement of track-laying technique has brought about many changes in material used for permanent way construction. Many railway authorities in various countries have considered, and in some cases have adopted, alternative materials for railway sleepers in place of the traditional timber form. Although much has been written about the various alternatives and much energy has been spent in trying to overcome the various snags which arise, up to the present little has been known of the advances made in Italy with the production of railway sleepers in asbestos cement. This article endeavours to bring to light some of the characteristics of this product.

Materials

Asbestos is a mineral substance and derives its name from the Greek meaning "inextinguishable." It contains a combination of qualities which make it an excellent material in many industrial processes. Its fibrous structure provides easy workability which, together with its inert values, fireproof qualities, and extreme resistance to climatic conditions, assists in providing non-corrosive and economical products.

The main variety of asbestos used in the manufacture of asbestos cement, is chrysotile (white fibre), a hydrated silicate of magnesia. This fibre is very pliable and contains an extremely high tensile strength approximating that of steel wire. The individual fibres are said to have a diameter of about 1/25,000 in.

The second commodity, Portland-type cement, needs little introduction except that the variety used in asbestos cement has superior and more consistent setting qualities than other forms of this material.

The asbestos fibres provide reinforcement to the cement — they are evenly diffused and point in all directions, forming a homogeneous structure.

Manufacture

During manufacture a thin slurry of cement, asbestos fibre, and water is passed to a tank in which a revolving cylindrical sieve picks up a thin film of material. This film is then transferred to an endless felt conveyor where the excess moisture is removed. The film is again transferred to a polished steel cylinder or mandril where the required thickness is built up. The total cohesion of the successive layers of asbestos cement and the denseness of the material is attained by applying pressure to the cylinder while it is revolving.

When required thickness is reached the ensuing layer is released from the cylinder and conveyed in the form of flat pliable sheet for trimming and cutting.

Railway sleepers are manufactured by compressing several thin layers of asbestos cement while still in a pliable condition and arranged in such a way that the fibres are evenly orientated. Compression is carried out to very high specific pressures in modern hydraulic presses equipped with dies and moulds. The finished article is completed in one operation during which the bushings for the fixings bolts are firmly incorporated, prescribed inclination of rail seatings provided, and token steel reinforcement placed longitudinally in the sleeper.

Research on railway sleepers was started before the 1939-45 war by an Italian, Ing. A. Mazza, then President of Eternit S.P.A. of Genoa, Italy, following his outstandingly successful invention for the manufacture of asbestos cement pressure pipes. For some 20 years previous to his attachment to this industry he had served on the Italian State and other railway organisations as a permanent way construction engineer. His approach in this field cannot therefore be entirely attributed to industrial enterprise, but as a correlation of his knowledge, first, of the problems facing railway engineers and, secondly, of the outstanding characteristics of asbestos cement.

Present Use

The first practical test of these sleepers was undertaken by the Italian State Railways near Frugarolo on the Genoa-Turin line in 1937. Following this test,

which was very successful, further laboratory experiments and subsequent improvements were made. These resulted in another successful practical test on the Milan-Genoa line near Voghera.

In January, 1957, the sleepers were used on high-density track, near Lungavilla again on the Milan-Genoa line, where speeds of up to 85 m.p.h. were experienced. Since this date Italian State Railways has used considerable numbers of the sleepers in its normal reconstruction and replacement programme for both main and secondary lines.

Similar sleepers have been laid in Germany, Finland, Mozambique and Venezuela. Lengths have also been laid in the international trial tracks in Holland.

At present, the sleepers are supplied in two classes. These vary in thickness dependent on their intended use, principally in respect of traffic density and speed. Both types are similar in shape to the traditional timber sleeper, being rectangular in section which is consistent throughout the length. Other types and shapes are being considered to suit specific requirements of various interested railway authorities.

Types Available

Two types of rail fastening are offered: (*a*) a rigid fixing for secondary lines and sidings and (*b*) spring type clips for high speed traffic. Both types are for use with flat-bottom rails and both are secured to the sleeper with bolts, the head of which fits into a bushing securely cast in the sleeper during manufacture. The following table gives dimensions of some of the types of sleeper already produced.

Thickness of sleeper (h)	c.m.	10	12	14
Weight (approx.)	k.g.	122	148	175
Spacing	c.m.	60	65	65
Maximum axle-load ...	Metric tons	24	25	25
Maximum speed	km/h	55	100	140

The unitary resistance of the sleepers when subjected to loads applied perpendicularly to normal orientation is stated by the manufacturer to be as follow:—

Compression	14,220—17,220 lb. per sq. in.
Flexibility	3,270— 3,410 ,, ,, ,, ,,
Shearing	3,410— 3,555 ,, ,, ,, ,,
Modulus of elasticity ...	3,000,000 ,, ,, ,, ,,
Weight	0.60 tons per cu. ft. (approximate)

Dimensions provide a safety factor of three over maximum dynamic loads.

Tests at Turin Polytechnic

The following table refers to results of tests carried out at the Polytechnic of Turin. The applied load was evenly distributed between the two rail positions while the sleepers were supported on chocks immediately below the rail position. The 14-c.m. sleepers are similar to those used at Lungavilla.

Thickness	Total breaking load	Bending moment
(cm.)	(tons)	(ton-metre)
14	95.0	4.75
14	98.4	4.92
10	55.0	2.75
10	51.0	2.55

Asbestos cement offers very high insulating characteristics. Tests of mass resistance, performed according to C.E.I. specifications on recently-manufactured or long-service sleeper sections, give values of about 10 ohm/cm.

Comparative resistances of various materials are given below.

Material	Resistance (M.ohm cm.)
Asbestos cement	10^2
Ground	10^2
Wood	50
Bricks (silica or bauxite)	80
Concrete	80

Electrical recordings taken in exceptionally severe weather conditions on track laid with asbestos cement sleepers, have revealed an overall track electrical resistance of 25 ohm/km., which is 25 per cent better than the values usually found on timber tracks in favourable weather conditions.

From the foregoing it will be seen that, while the electrical qualities are not entirely satisfactory for modern permanent way construction, they do indicate a superior quality to other forms of sleeper material. Complete isolation of the rail can be achieved by the introduction of non-conductive pads between rail and sleeper or fastening accessories.

Track Construction and Maintenance

The foremost problem in the minds of railway engineers is how to minimise maintenance to permanent way while maintaining safety standards. This problem must be considered in relation to the function of the material and its various properties.

Many authorities agree a substitute for the traditional timber sleeper should be of material which will hold its properties for a minimum of 40 years (twice the life of the steel track) and at the same time give a performance better than that of timber preferably at equivalent cost. If these conditions are fulfilled, the greater part of maintenance will be eliminated.

Working Life

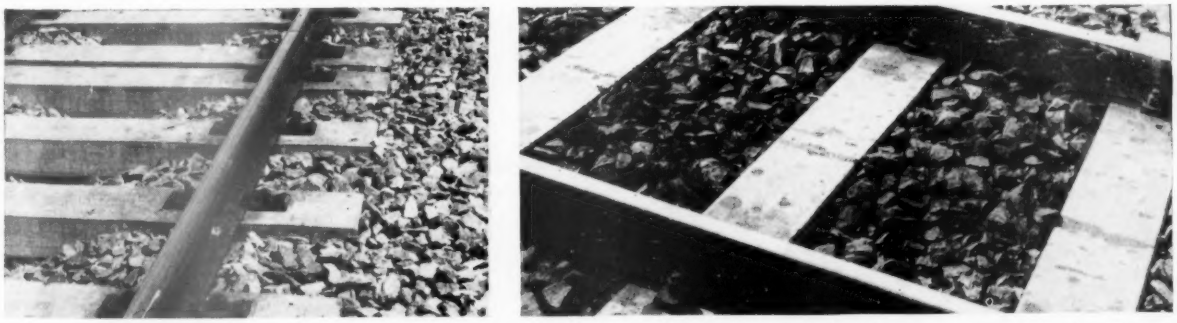
While the life of the asbestos cement sleeper can only be assumed, practical tests show that it remains unaltered after 20 years of use, while accelerated tests would appear to show that expected active life is a minimum 50 years without loss of any physical or mechanical properties.

The close and interwoven diffusion of fibres in the sleeper help to maintain the effects of external wear. The complete absence of inert materials (i.e., aggregates) prevents crumbling, and a high tensile strength permits the resistance of heavy impact without chipping or cracking.

Storage Advantages

The method of rail fixing is of advantage in storage conditions as there are no fixing hooks or attachment to protrude beyond the normal rectangular section of the sleeper. As previously mentioned, the fixing bolt is inserted in a socket bushing which can also house a device with a similar head for lifting during construction. Furthermore, if rail substitution is required after the sleeper is laid in position, detachment of the bolts can be carried out without damaging the sleeper itself. A grid of diamond-shape impressions made on the underside of the sleeper during manufacture ensures perfect grip of ballast.

It is claimed that this sleeper, when specially designed to given requirements, can be successfully and confidently used in almost any circumstances not only for all forms of national or public transport but also in private industry. In this last respect it would appear to offer particular advantages, because of the ease of its handling and installation where tracking is of a temporary nature.



Sleepers laid on Italian State Railways in 1937 and photographed this year: (left) with F-type rail fastenings for high-speed running, and (right) with rigid rail fastening

Fully-Automatic Bus-Washing Machine

Prototype installation at Harrow Weald Garage of London Transport

Bus being sprayed from sparge pipes above. On the right are the squeegee for roof cleaning and the vertical-brush washing machine

A FULLY-AUTOMATIC bus-washing machine has been brought into use at the Harrow Weald garage of London Transport. It is the prototype of a design which requires only one man in attendance, and which will be followed for all new bus washing installations in London Transport garages. All existing machines of the vertical brush type are to be modified in due course to work on the same principle.

As a bus approaches the machine it passes through a light ray operating on a selenium cell. This, in turn, actuates an electric relay system which turns on the water supply to the installation and starts the brushes of the machine in a pre-determined sequence. The whole process is automatic and the operator is needed only to wash the front or back of the bus, which are not dealt with by the machine. The average time for the combined sequence of operations is one minute. For comparison, the suspended box frame type of machine which has been in common use for some years by London Transport requires about four times as long to operate and a considerable amount of judgment and practice is needed by the garage staff in its use.

Manpower Saving

The saving in manpower, as compared with hand washing, is considerable. In a garage of 100 buses, taking into account both regular night servicing and special periodic washing, it will be of the order of six men. The standard cycle of operation is preceded by the bus interior being vacuum cleaned during refuelling near the garage entrance which takes about four min. Where the input of vehicles demands it, two service lines feed one washing machine. The bus is then driven forward to the washing plant and is positioned between guide rails with the off-side front wheel resting on a plate fitted with two bars. Just before it reaches the correct position, the bus obstructs a concentrated beam of light from a roof-mounted lamp shining on to the selenium cell which is mounted on the garage wall and carefully hooded against strong light reaching it from other sources. The first of a series of timed relays to be energised at this stage causes water to issue from a perforated pipe in the roof running the length of the bus. This " sparge " pipe rinses the entire length of the bus roof and shorter transverse pipes at each end spray the ends of the vehicle. The flow of water is continued for a pre-determined length of time during which the operator brushes either the front or back of the bus. Fronts and backs are brushed on alternate days.

Simultaneously with the cessation of water flow from the sparge pipes, the vertical brushes and water sprays of the washing machine a few yards ahead are turned on.

Roof Cleaning by Squeegee Action

The driver moves the bus forward as soon as he sees the washing machine come into action and as he does so the roof is cleaned by passing under a squeegee made up of four thicknesses of felt shaped to the correct contour. Daily cleaning by the squeegee action so obtained makes rotary brush roof washers unnecessary. In the washer itself the vehicle sides are cleaned by the rotary flailing action of nylon brushes. The Februat machine at Harrow Weald is practically a standard model with a vertical row of nozzles on each side to wet the sides of the bus just before it reaches the brushes and another row beyond the brushes to give a final rinse.

Electrically-driven Brush Columns

The brushes are disposed along two vertical electrically - driven rotating columns, one on each side of the bus. The only variation from the standard commercial machine is the provision of two extra brushes each side to improve the cleaning of heavily caked dirt on the lower panels in bad weather. The power to the motors driving the vertical brushes, and the water supply to the rows of nozzles, are both turned off automatically after a length of time sufficient to allow the bus to be driven completely through the washer at slow speed before being taken away to its parking place. The washing apparatus is then ready to take a second bus, which can be drawn up ready to move into position as soon as the first is clear.

Apart from the saving of labour and in time as compared with hand washing, or washing with the type of machine which has to be lowered over a carefully-positioned bus and raised clear again, the new arrangement effects considerable economies in electricity and water.

Manual Over-ride Control

If required, for any special purpose, the control apparatus can be switched from " automatic " to " manual " enabling the washing process to be controlled from wall switches. The timing of the relays controlling automatic operation can be varied at will to take account of varying conditions in different garages. The prototype installation, with its control apparatus, was devised by London Transport engineers under the direction of Mr. K. G. Shave, Rolling Stock Engineer (Road Services) to the requirements of Mr. A. A. M. Durrant, Chief Mechanical Engineer (Road Services), London Transport.

ROUTEMASTER BUSES IN SERVICE WITH LONDON TRANSPORT.—The recent introduction into passenger service by London Transport of large numbers of the 7¼-ton 64-seat Routemaster bus marks almost the final stage in a development programme which has been under way since the first prototype (RM.1) was exhibited in 1954. Present RM vehicles have been designed and developed by London Transport in association with A.E.C. Limited, and Park Royal Vehicles Limited. Weight reduction is achieved by monocoque construction mainly in light alloy, with bonnet and front grille of glass fibre. Features include power-assisted steering, automatic transmission control by Self Changing Gears Limited and C.A.V. Limited, a combined saloon heating and ventilation system, and independent front suspension by equal-length wishbones. Rear suspension is by coil springs. Air springs are being given trials on 50 vehicles.

Modification of Columbia River Bridge

Provision of a 320-ft. lift-span and raising of 20 fixed-spans necessitated by rise in water level

View under 102-ft. deck-span, showing jacks and grillage after being placed in position for raising span

THE Columbia River, separating the states of Washington and Oregon in the United States, has recently been dammed at Dalles, heading up the river level and threatening to submerge part of the Celilo Bridge carrying the Oregon Trunk Railway over it. It therefore became necessary to alter the bridge in two respects as explained in an editorial article on another page. Some 2,300 ft. of it consisting of 20 spans—two 230-ft. and 18 102-ft.—have had to be raised, and its 320-ft. span has been converted from a fixed- to a lift-span in place of a smaller swing-span.

At the northern end of the first 102-ft. span the bridge bifurcates in the form of a "Y," there being eight 102-ft. spans in the western arm and nine in the eastern arm of the "Y." The two northern 230-ft. spans and all 20 102-ft. spans like the rest of the bridge were constructed on a gradient of approximately 1 in 200 falling towards the two northern abutments, one on each arm of the "Y."

Rise in High-Flood Level

Before the construction of the dam the maximum high-flood level at the bridge was 159·2 ft. above sea level, whereas the highest water level of the reservoir formed by the dam is 163·4 ft. The southern part of the bridge as far as main pier No. 8, supporting the third and fourth 230-ft. spans, has a base-of-rail level of 182 ft. at that pier or higher, giving sufficient headway above the new water level. Beyond that pier base-of-rail level previously fell to about 177 ft., by the time the northern abutments were reached, a level such that the bottoms of the 102-ft. plate deck girders would have been submerged.

Accordingly it was decided that the minimum base-of-rail level should be 182·6 ft. requiring the spans resting on the northern abutments to be raised by 5 ft. 6 in. Working backwards thence to main pier No. 8 the extent of the raising was gradually reduced to zero, and the 18 102-ft. and two northern 230-ft. spans were thus raised to a uniform level gradient. The gradient of the southern part of the bridge remains at 1 in 200.

Raising of Spans

The raising of the 20 spans was carried out under traffic. The northern approach embankments were raised and widened simultaneously with the lifting of the northern spans, the work being done departmentally by railway labour, but the span-raising was entrusted to contractors. To provide jack-seating, temporary outrigger brackets were fitted span by span and in the case of the trus-s spans stiffeners were welded to the end floor-beams so that the webs of the outriggers could be connected to the outstanding stiffener legs. Lifts were of from 8 in. to 12 in. and oak packings were used as temporary supports until each part of the permanent steel grillage—subsequently to be encased in concrete—could be completed. The concrete-encased grillages were finished off as top cap extensions of the piers.

Conversion to Lift-span

The second work necessitated by the building of the dam was the conversion of the 317/320-ft. span from a fixed- to a lift-structure. The reasons for this are given in the editorial article which also explains why tower-drive as opposed to span-drive machinery was preferred in this instance.

This pin-connected truss-span is situated between the revolving or swing-span and the first of the 230-ft. through truss-spans. It was therefore necessary to construct the two braced vertical lift-towers framed into these two adjacent spans. They were, in fact, built up in vertical extension of the end or portal panels of the trusses as the illustration of the converted span shows.

Additionally this involved certain modification of the existing members of those spans and also of the 320-ft. span. Moreover, to carry the towers rigidly and distribute the additional loads involved, the expansion bearings of the adjacent spans were converted to fixed bearings

The eastern arm of the bridge, showing the spans raised on concrete-encased grillages forming new pier-caps

The 320-ft. span still fixed, showing cranes ready to build towers and convert span as a lift structure

and additional bearings were provided. The permanent closing of the swing-span was also involved.

To make the 320-ft. span suitable for lifting, bracketed additions had to be made at each end to provide a vertical or nearly vertical portal suitable for attachment to the suspension cables for raising and lowering. The erection of the steelwork in the towers and spans was carried out with cranes mounted on the top chords and over the end panel-points of the 320-ft. span.

The span is counter-weighted and suspended by steel ropes passing over sheaves at the tops of the towers where the operating machinery is located. The counterweight boxes were cast in concrete in their raised positions, the forms being supported by jacking frames while the concrete was being placed and until the suspending ropes were attached.

In normal working the time taken to raise to the full 75-ft. height or to lower the span is 1½ min., but with the emergency mechanism this takes 7½ min.

Lifting and Control Equipment

The all-electric lifting and control equipment drives two sheaves on the top of each tower by two separate Westinghouse d.c. adjustable-voltage motors through reduction-gearing cross-shafts and pinions. All four motors are synchronised to insure that the span is kept level when being operated. All movements are interlocked to insure that they follow a predetermined sequence and secure safety. The skew control equipment provided has safeguards against abnormal conditions and requires a minimum of maintenance. The whole of the co-ordinated electrical system in addition to the main driving motors includes auxiliary motors, brakes, an emergency petrol-electric generating set, motor-generator, and control equipment, and was supplied and erected by the Westinghouse Company. In case of emergency, auxiliary motors are provided, these being powered either by the commercial current normally used for operating the bridge or by a.c. supplied by the petrol-electric generating set. It also supplies current for the electric brakes, a passenger lift and lighting when necessary.

Power Supply and Interlocking

Power is normally obtained from ordinary commercial sources, failing which the emergency petrol-electric set is available. Electric interlocking insures that when the span is to be lifted to pass shipping the railway signals are set against trains by a switch on the control desk and this automatically provides power for controlling the operation of the span through a railway interlocking relay. If the signals are "off" the bridge is locked in its lowered position.

The whole of these works have been carried out under the general supervision of Mr. H. F. Moy, Chief Engineer, Spokane, Portland & Seattle Railway Company—of which the Oregon Trunk Railway is a subsidiary—to whom we are indebted for most of the information given above.

The lift-span electric machinery and controls were entrusted to the Westinghouse Electric International Company which also contributed to this information. The railway signalling and interlocking with the bridge were carried out by the railway staff.

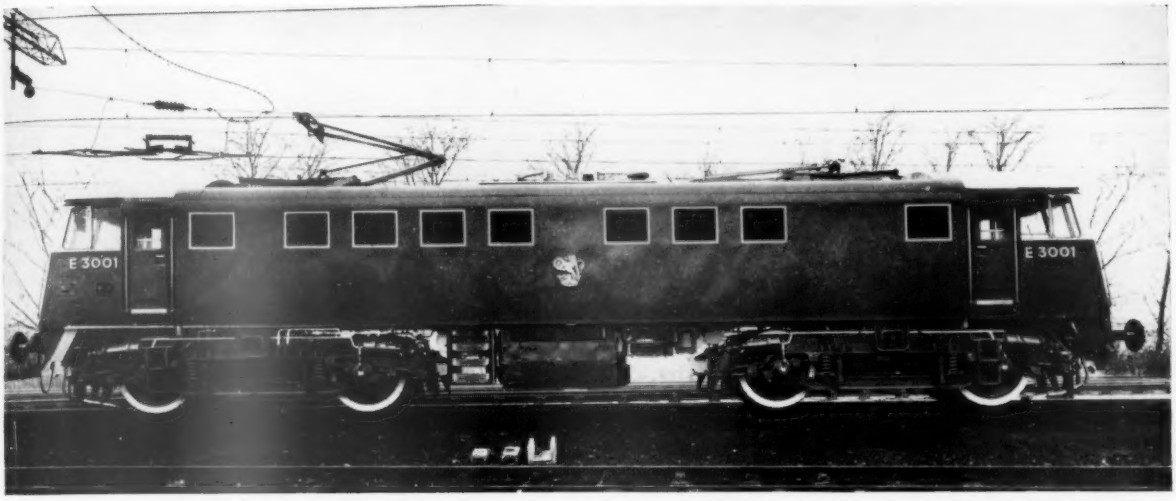
STAFF DRIVING AWARDS FOR WESTERN REGION ROAD MOTOR STAFF.—In the Board Room at Paddington Station, on November 23, 18 road motor drivers of British Railways, Western Region, received awards for accident-free driving in the London district ranging from 25 to 32 years. During the year, 245 drivers attached to Paddington Goods Depot took part in the National Safe Driving Competition under the auspices of the Royal Society for Prevention of Accidents, and 192 gained awards for accident-free driving. Of the remainder, 13 were not included in the competition. The average mileage covered by each driver during 1958 was 7,512. The awards were presented by Mr. E. Flaxman, Commercial Officer, Western Region.

MORE PLATFORM LOUDSPEAKERS FOR L.T.E. UNDERGROUND.—Loudspeakers are to be operating soon on 42 more London Transport Underground platforms for giving information to passengers. Fourteen of these, at Aldgate, Camden Town, Acton Town, Hammersmith, Arnos Grove and Bond Street Stations, were installed recently. The remainder will be brought into use by the New Year at Mansion House, Euston, Kennington, Finsbury Park, Harrow-on-the-Hill, Rayners Lane, Kings Cross, Holborn, and Finchley Road. They will be used for passing emergency messages and explanations to passengers in the event of breakdowns or delays. L.T.E. already has a number of loudspeakers in use and when the present installation is completed there will be loudspeaker equipment on a total of 116 platforms at 39 important Underground stations; 12 platforms were fitted earlier this year.

Conversion completed, showing span in raised position to permit navigation

First A.C. Electric Locomotive for British Railways

London Midland Region type "A" 3,300-h.p.
80-ton 25-kV. 50-cycle a.c. unit



British Railways type "A" 3,300-h.p. 25-kV. 50-cycle a.c. electric locomotive, one of 23 being supplied by Associated Electrical Industries Limited for service in the London Midland Region

IN connection with the modernisation plan for British Railways, the British Thomson-Houston Co. Ltd., now incorporated in the Associated Electrical Industries Traction Division, is supplying 25 complete a.c. electric locomotives, the mechanical parts for which have been sub-contracted to the Birmingham Railway Carriage & Wagon Co. Ltd. There will be 23 type "A" locomotives, and the remaining two to be delivered later will be of British Railways type "B" designation.

The specification for the type "A" locomotive requires that it shall be capable of hauling a 475 ton passenger train at 100 m.p.h. and a 950 ton mineral train at 55 m.p.h. The unit is of the Bo-Bo type equipped with four series-wound traction motors mounted on two fabricated bogies, and the nominal weight is 80 tons. The type "B" unit is identical except for the gear ratio which is arranged for a maximum speed of 80 m.p.h.; it will be capable of hauling mineral trains of up to 1,250 tons at a speed of 55 m.p.h.

Locomotive Layout

The locomotive is of the double ended type and the driving compartments at each end are connected by a corridor. Behind each driving compartment is a space in which are housed the compressor, exhausters, traction motor blowers and other equipment. The centre compartment, to which access is gained through an interlocking door at No. 2 end, houses the control gear, transformer, and rectifiers. The interlocking allows access to the compartment only when the pantographs are lowered and the h.t. equipment earthed. The control and transformer compartments are caged in a full height aluminium expanded metal enclosure. The rectifier compartment is sealed by an enclosure of sheet aluminium panels.

The locomotive is designed primarily for operation at a line voltage of 25 kV. 50 cycles. It also has to operate with full output at 6.25 kV. because certain sections of the overhead line have limited electrical clearance and are fed at this reduced voltage. This is achieved by arranging the main transformer primary winding in four sections, connected in series for a 25 kV. supply and in parallel for a 6·25 kV. supply. This is effected automatically by an oil-immersed off-load changeover switch.

For the transformer oil cooling, two Serck radiators, connected in series, are fitted under the roof. Mounted at deck level is a 300 g.p.m. Pulsometer circulating pump driven by a B.T.H. motor. An expansion tank is mounted on No. 1 cab bulkhead. Each radiator is cooled by an Aerex axial flow fan, drawing air through the bodyside and up through the horizontal radiator. Discharge through the roof is via a louvred hood, moulded in glass fibre, which is above both radiators.

Current Collection

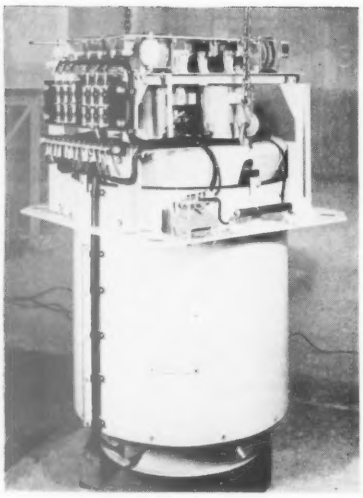
Current collected from the overhead wire by pantographs of the Stone-Faiveley AMBR pattern is fed through a Brown Boveri air-blast circuit breaker mounted on the roof to the main transformer. The output of the transformer is converted to direct current for the traction motors by three air-cooled six-anode pumpless steel-tank mercury-arc rectifiers, diametrically connected in parallel so that each tank has three anodes in each half cycle. Load sharing reactors are provided to ensure current sharing between tanks and individual anodes. Smoothing chokes are also provided.

Rectifier Cooling

Each of the three rectifiers has an independent automatic temperature control system. An Aerex fan draws air through the body side and this is trunked to the base of the rectifier, through which it discharges upwards into a roof chamber which is vented to atmosphere. On the suction side of the fan ducting is an opening into the roof chamber. In this opening is an electric heater. Thermostatically controlled shutters are fitted to the heater and on the bodyside louvres. When starting up from cold the bodyside shutters are closed and the heater panel shutters open. Air is then circulated by the fan on a closed circuit through the heater and rectifier. At a temperature determined by thermostats the heaters are switched off, and a short circuiting contactor closes across the traction motors enabling the rectifier heating to be continued by passing a low voltage current through them. This contactor has interlocks which ensure the traction motor reversers are in mid position to open the motor circuits. When normal working temperature is reached the thermostat switches off the heater. When higher air temperatures are reached, other thermostats close the heater panel shutters, and open the cold-air inlet shutters in the bodyside.

Traction Motors

The four traction motors are connected permanently in parallel. They are six-pole series wound machines specially developed for operation on a rectified



Air-cooled six-anode pumpless steel-tank mercury-arc rectifier

50-cycle single-phase supply. The motors are forced ventilated and designed for long periods of operation between overhauls. This has been achieved by using, among other things, class " H " insulation and special lubrication arrangements. The ratings of the motors are as follow:

Continuous rating	... 975V.	700A.	847 h.p.
One-hr. rating ...	... 975V.	760A.	920 h.p.
Gear ratio type " A "	... 29/76		
Gear ratio type " B "	... 26/83		

One traction motor blower is fitted behind each cab bulkhead. Also fitted in the compartment behind No. 2 cab are the two tier-mounted exhausters and a small battery-driven Clayton compressor. This provides an emergency air supply for raising the pantograph in the event of a fully discharged main reservoir.

Control Equipment

A camshaft control unit, actuated by the driver's master controller, provides 37 accelerating notches and two field-weakening notches. Voltage control is by on-load tap-changing on the low-voltage side and the output is fed to the rectifiers through two high-speed circuit breakers, thus rendering anode fuses unnecessary. Besides giving protection against backfires, these breakers are also used as contactors during ordinary locomotive operation so that no individual motor contactors are provided.

The two traction motor blowers, three rectifier cooling fans, two transformer oil cooling radiator fans, and the transformer oil circulating pump are driven by a.c. motors. One exhauster is battery fed; the other exhauster and the compressor are fed from the a.c. supply through germanium rectifiers. The battery is floating continuously on a battery charger of the magnestat type which also incorporates a germanium rectifier.

The principal characteristics of the locomotives are as follow:

	Type " A "	Type " B "
Wheel arrangement ...	Bo-Bo	Bo-Bo
One-hr. rating	3,680 h.p.	3,680 h.p.
Continuous rating ...	3,300 h.p.	3,300 h.p.
Top speed	100 m.p.h.	80 m.p.h.
Weight	80 tons	80 tons
Maximum tractive effort at peak notching current ...	48,000 lb.	60,000 lb.
Tractive effort at continuous rating of motors	20,000 lb.	24,000 lb.
Speed at continuous rating of traction motors	60 m.p.h.	49 m.p.h.

Locomotive Superstructure

The complete body of the locomotive is designed as a weight-carrying structure. Each side of the body takes the form of a deep lattice girder with diagonal and vertical " I " section members, to which the 12-gauge skin is attached. The two sides are braced together at roof level with a series of formed members, thus forming a rigid box structure of minimum weight for the support of the main frame and equipment.

The roof height of the power compartment is limited by the safety clearance required between the roof equipment and the high-voltage overhead supply line, and to provide a comfortable working height in the cab, the cab roof is extended above the main roof height. To improve the appearance of the stepped roof a glass-fibre fairing, moulded to the corner radius, extends for the full length between the two cabs.

The cab roof is a double-skin glass-fibre moulding. At the cab front there is a three-piece screen, the driving panels being fitted with pneumatic wipers. These screens incorporate a layer of transparent gold film in the laminations which forms an electric heating element to act as de-icer and de-mister. Full drop windows are fitted in the cab doors and adjacent to the seats. These side windows are also fitted with hinged two-position draught deflectors.

The power compartment roof is made in five detachable sections, some of which are constructed in glass fibre and the others in steel. Four fixed windows are fitted on the corridor side of the body and nine louvred air intakes on the opposite side. Rubber water drainage pipes are taken from these, and from the pantograph roof well, down the inside of the body. Recessed code lamps and destination indicators are fitted at the front of each cab.

Cab Layout

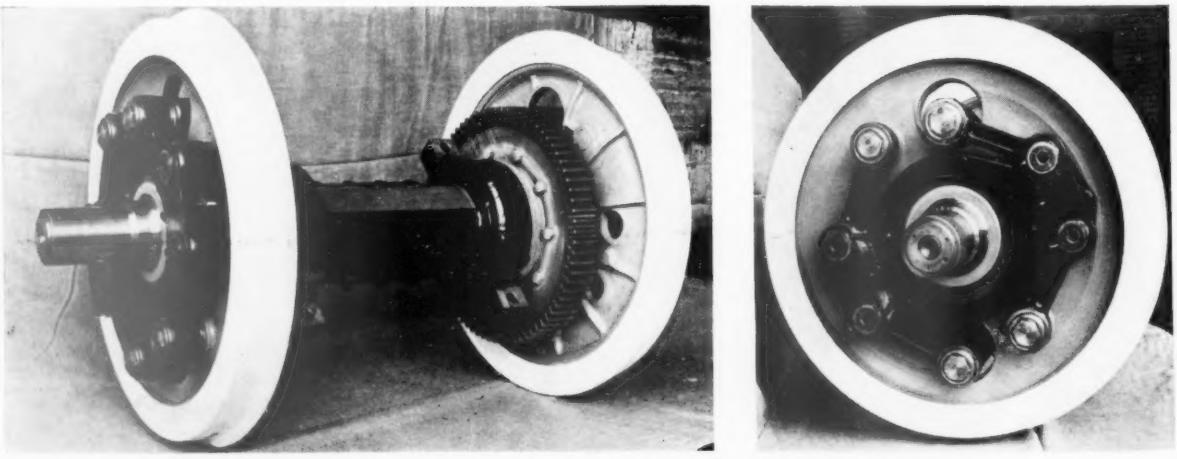
The driver's seat fitted at the left hand side is upholstered and fully adjustable. On the opposite side is a similar seat for a second man. A full height glazed screen is fitted behind each seat and on this is mounted a heater. Similar heaters are fitted below each side window and on the rear bulkhead. Also on the rear bulkhead is the handbrake wheel.

The driver's controls are positioned on a flat top knee-hole type desk, with the air brake and vacuum brake valves on the left and the speed controller and reverser on the right. The driving instruments and brake gauges are carried on a sloping facia panel mounted below the windscreen. Three ceiling lights are fitted. The cab floor is in natural finish maple, grooved to provide a tread pattern surface.

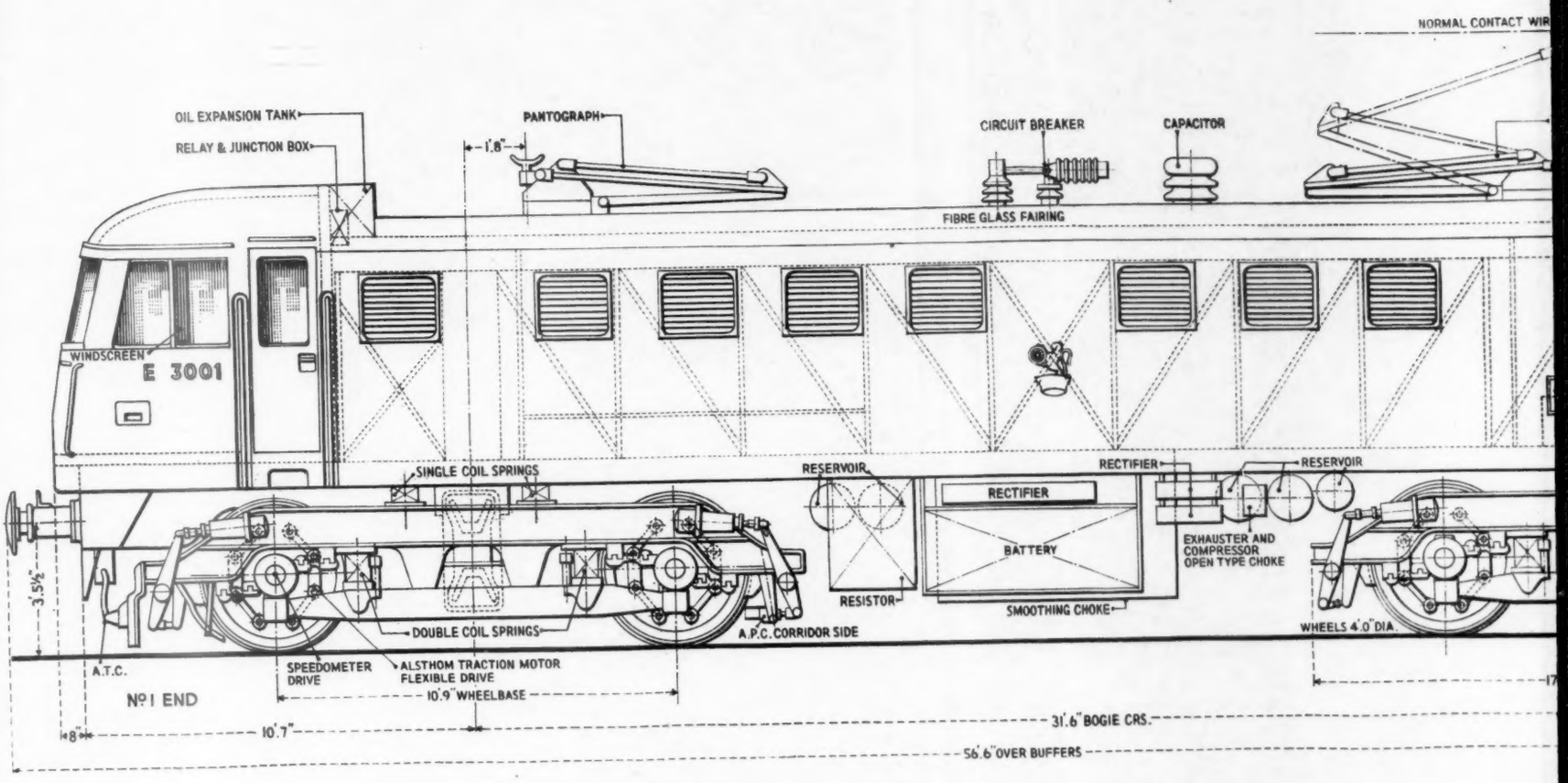
Bogies and Body Suspension

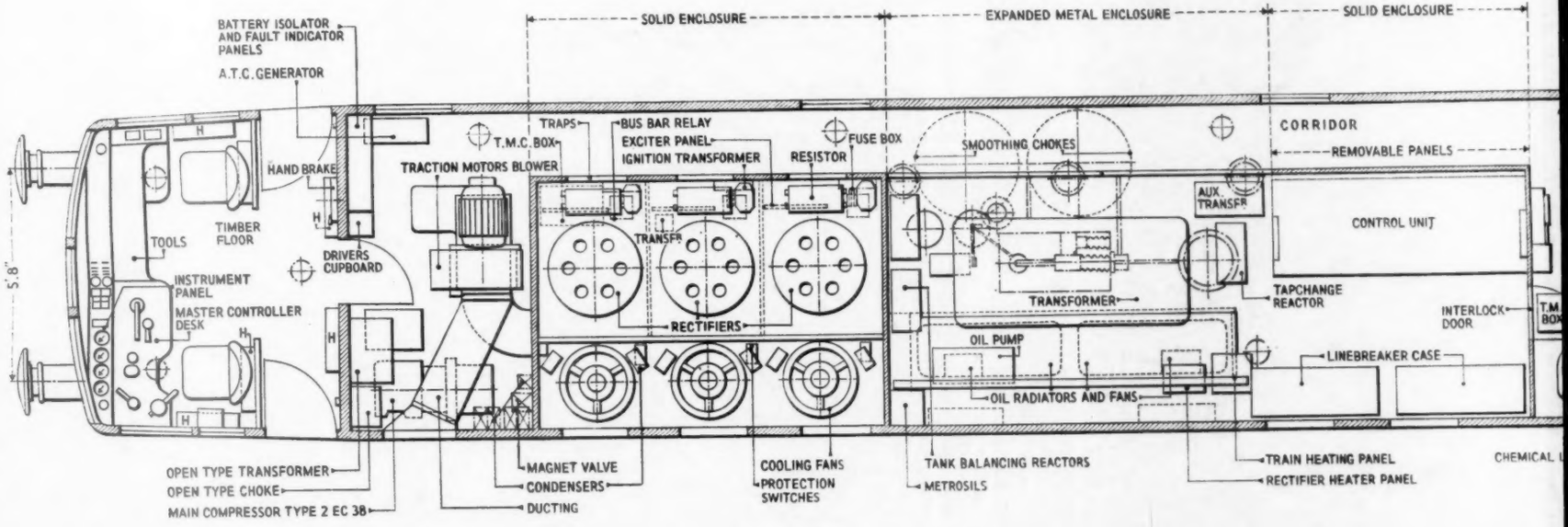
Used in service for the first time on a British Railways locomotive is the Alsthom system of rubber cone pivot body suspension, radius arm guided axle boxes, and flexible link drive to the wheels. These features combine to give good riding characteristics and reduce unsprung weight, and maintenance costs.

The four-wheel bogies of the

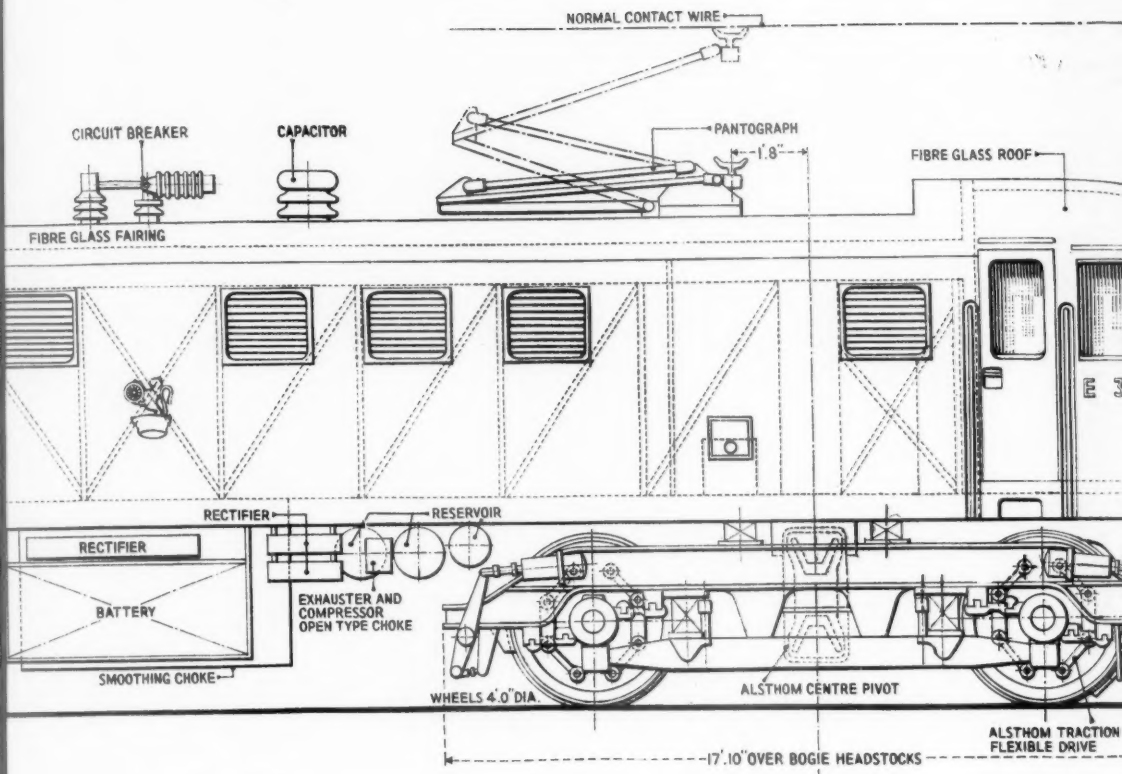


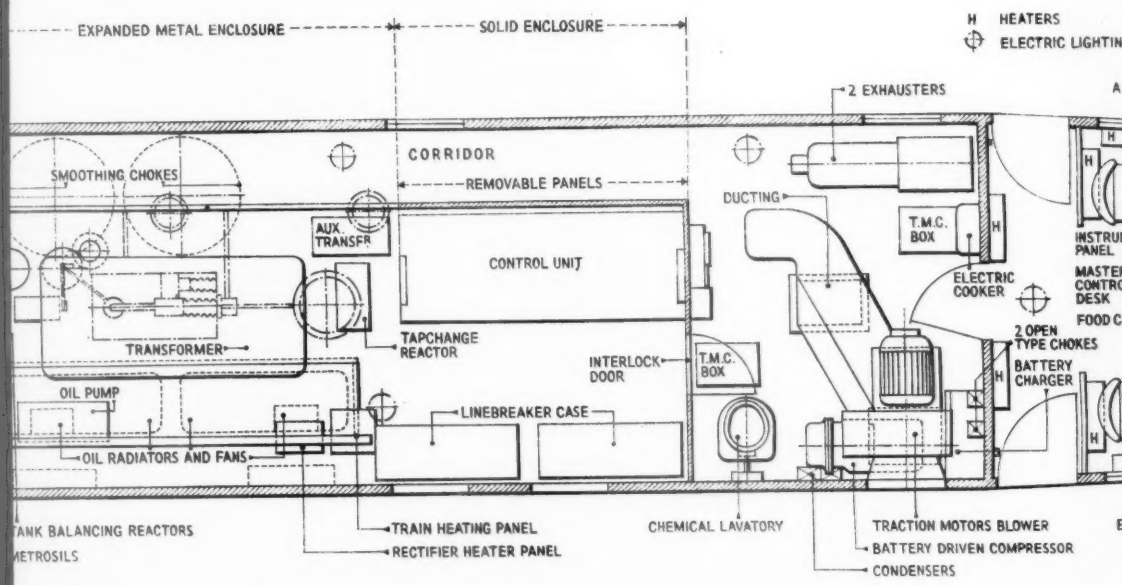
Wheel and axle set, left, and end view of wheel, right, showing Alsthom drive



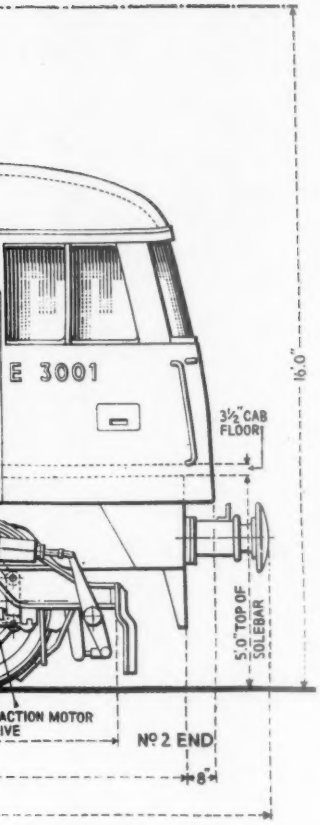


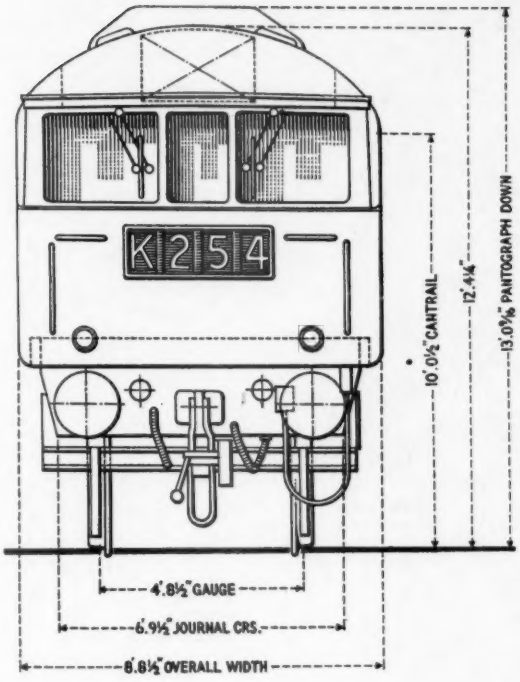
BRITISH RAILWAYS TYPE "A" Bo-Bo 3,300-H.P. 25-kV. 50-C



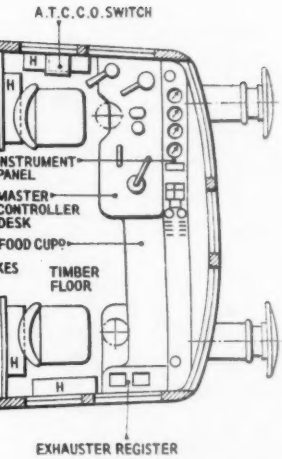


TYPE "A" Bo - Bo 3,300-H.P. 25-kV. 50-CYCLE A.C. ELECTRIC L





UGHTING



WEIGHTS
ELECTRICAL EQUIPMENT = 40 TONS
MECHANICAL EQUIPMENT = 40 TONS
TOTAL RUNNING WEIGHT = 80 TONS

LOCOMOTIVE

underslung equalising beam type are Corten steel welded fabrications. Solebars and main members are of hollow box formation. The bogie frame is supported on four nests of double coil helical springs from the low-level equalising beams. Shock absorbers are fitted and the rise of the primary springing is checked to maintain clearance within the quill drive of the traction motor.

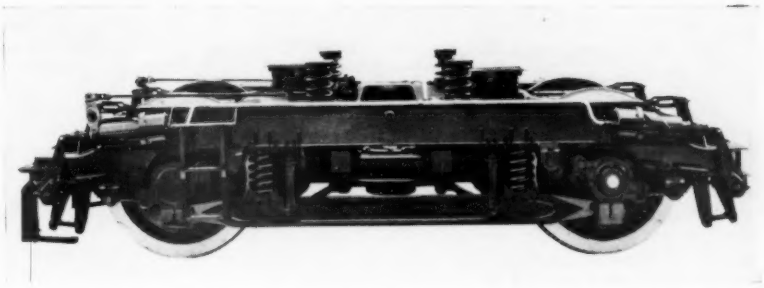
The equalising beams are carried from the axleboxes on combined shear and compression rubber pads which, in conjunction with the fully sprung traction motors, reduce deadweight on the track to a minimum.

No fixed guides are used for the S.K.F. roller bearing axleboxes, each box being carried by two Silentbloc-bushed radius arms anchored to the bogie frame. This cushions the fore-and-oft forces and provides a degree of lateral resilience which reduces wheel flange wear.

Bogie Pivot

On each bogie the body is carried on a double-ended cone rubber pivot, fitted in a fabricated carrying member which is transversely anchored to the underframe through spring loaded units. The transverse spring anchorage maintains the vertical alignment of the pivot. A proportion of the body load is transmitted to the bogie through four spring-loaded side bearers. The side bearers, fitted with manganese wearing pads, are mounted on the bogie frame and arranged so that the proportion of load carried on the bearers can readily be adjusted. Lubrication has largely been eliminated by the use of rubber bushes, but where required Tecalemit lubrication is provided.

The traction motors are resiliently suspended on the bogie frame on three-point mountings, no vertical thrust from the motors being transmitted to the axles. The two suspension points at the crossbars are of conical form to insulate the motor from horizontal shock loading.

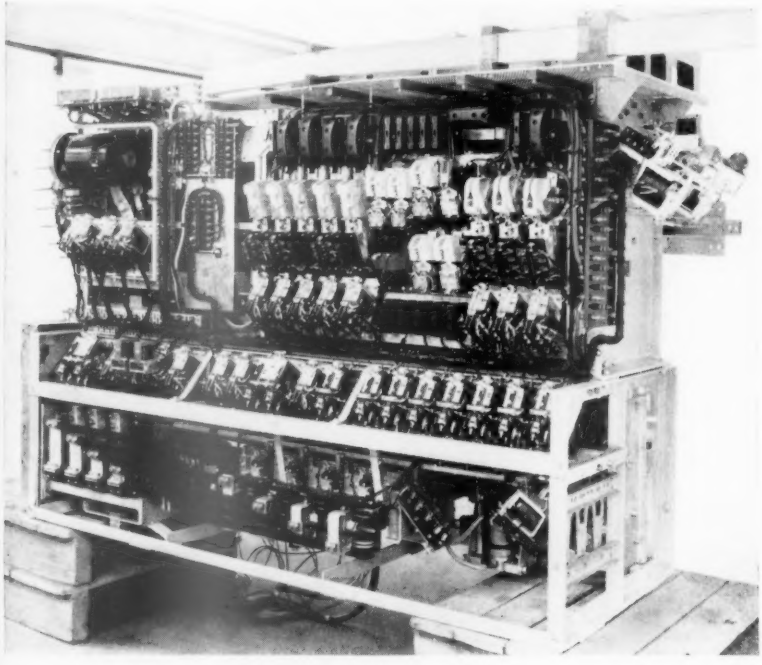


Locomotive bogie, showing the two rubber cone pivots and four spring-loaded side bearers

From the reduction gear on the motor the drive is taken through a hollow shaft to a universal link assembly, which in turn drives the wheel. Four links are used, bushed at each end with a Silentbloc bush. The drive ends of one pair of links are attached to the hollow shaft of the reduction gear, and the ends of the other pair to drive pins attached to the wheel. The inner ends of the four links are anchored to a floating ring on the outside of the wheel. This arrangement provides a cushioned drive between motor and wheel and permits free vertical movement of the axle. The use of rubber bushed pivots eliminates all lubrication of the linkage.

Welded Underframe

The underframe is a welded structure of 8 in. by 3½ in. channel section longitudes and 8 in. by 3½ in. angle section crossmembers. An inner and outer solebar form continuous members at each side. These are butt welded to the box-section headstocks, which are fabricated in ⅜ in. plate. A robust plate fabrication forming the draft bar is fitted between the headstock and bolster. In the centre of the frame is a recess for the transformer and extending from this recess to each bolster are two channel section longitudes. All openings between the members are filled with 12-gauge steel plate, forming a flush deck. The sandboxes are incorporated in the box-section headstocks. Standard draw-gear and couplings are fitted, together with Oleo Pneumatic buffers.



Camshaft and control frame

Brake Equipment

The system comprises a vacuum controlled straight air brake which operates an air pressure brake on the locomotive in conjunction with a vacuum brake application on the train. An independent air-brake valve is fitted for use when running light and when hauling unbraked trains. All equipment, which is of Westinghouse design and manufacture, is of the recently introduced lightweight type incorporating synthetic rubber valve seats and rubber diaphragm operated valves instead of pistons.

The clasp brake rigging on each bogie is operated by four externally mounted 8 in. dia. type "J.S." combined brake cylinders and slack adjusters. Operating at a maximum pressure of 70 lb. per sq. in. the nominal brake force is equivalent to 85 per cent of the locomotive weight. The brake blocks consist of cast steel heads and renewable cast-iron shoes.

Air for the locomotive brakes and other pneumatic equipment is provided by one type "2 EC 38" compressor, driven by an integral electric motor operating off the low-voltage control system. The major components of this new two-stage compressor are made in light alloy, and a compact intercooler is incorporated.

Vacuum for the train brake operation is created by two type "4 V 110 L" reciprocating exhausters. These are driven by flange-mounted B.T.H. motors, arranged for two-speed operation, and fed from the low-voltage control supply. The change from the normal low-speed running to the higher speed for brake release is controlled automatically by switch contacts on the driver's vacuum brake valve. To facilitate uncoupling from a braked train, provision is made

for releasing the locomotive brakes independently of the train brakes.

Two rates of deadman's brake application are provided on the locomotive to suit the class of train being hauled. Selection is by the Braked/Unbraked changeover switch. This does not affect the driver-controlled braking, but allows a slower rate of application of the deadman's brake when hauling unbraked stock. During a deadman's application the traction circuits are automatically broken by the vacuum control governor. Chokes are fitted at suitable points in the system to ensure that in the event of a hose coupling failure, the full braking remains available on the unaffected bogie. The two brake supply reservoirs are 15 in. dia. by 36 in. long and the two main reservoirs are 15 in. dia. by 48 in. long. Considerable weight saving has been achieved by constructing these reservoirs in high-grade stainless steel. The handbrake is arranged to operate, through the power brake rigging, on the outside wheels of the adjacent bogie.

The locomotive has been designed to the general requirements of the British Transport Commission under the overall direction of Mr. S. B. Warder, Chief Electrical Engineer, British Railways Central Staff.

The principal sub-contractors are as follow:

Mechanical equipment (including drawgear)	Birmingham Railway Carriage & Wagon Co. Ltd.
Rubber elements in drawgear	George Spencer, Moulton & Co. Ltd.
Transformer oil coolers	Serck Limited.
Pantographs	J. Stone & Co. (Deptford), Ltd.
Air-blast circuit breaker	Brown Boveri & Co. Ltd.
Transformer fans, rectifier fans, traction motor blowers	Aerex Limited
Battery	Nife Batteries Limited.
Capacitors	British Insulated Callender's Cables Limited. Telegraph Condenser Co. Ltd.
Train heating jumpers	General Electric Co. Ltd.
Auxiliary compressors	Clayton Dewandre Limited.
Cable	Siemens Edison Swan Limited
Brakes, including compressors and exhausters	Westinghouse Brake & Signal Co. Ltd.
Wheels and axles ...	Owen & Dyson Limited.
Buffers	Oleo Pneumatics Limited.
Quill drive links ...	Silentbloc Limited.
Axleboxes	Skef'ko Ball Bearing Co. Ltd.
Bogies centre pivot rubbers	Empire Rubber Co. Ltd.
Cab instruments ...	Nalder Bros. & Thompson, Ltd. Record Electrical Co. Ltd. Westinghouse Brake & Signal Co. Ltd.
Windows	Beckett, Laycock & Watkinson Limited.
Glass fibre mouldings	Birmingham Railway Carriage & Wagon Co. Ltd.
Windscreen wipers ...	Trico Folberth Limited.

Re-using Spent Ballast

Plant at Sandiacre washes 80,000 *tons a year*

A CONSIDERABLE saving to British Railways in the cost of stone ballast is being achieved by the use of a ballast-washing machine at Sandiacre, London Midland Region, where about 80,000 tons a year of dirty ballast is cleaned to produce some 60,000 tons for re-use.

After removal of the spent ballast from the track it is transported to Sandiacre where washing and simultaneous agitation rids it of the ash from locomotives, wagon spillage, and any clay and other material which has worked up from the formation to hinder its function as a drainage medium.

The availability of this bulk method of washing ballast for re-use makes the preservation of track stability and the discouragement of sleeper decay and weed growth more economical than would be possible using entirely new ballast.

The plant consists of two Contraflow washing machines, with hoppers, rotating screens fitted with baffle plates, and conveyors to load the washed ballast direct into wagons. The dirty ballast is transferred from the wagons to the hopper by means of a Ruston-Bucyrus mechanical grab, and for a period of several minutes while it is passing through the machine, it is subjected to a strong flow of water and considerable agitation. At the discharge end the clean ballast is graded by the screens into four sizes. These are: over-size material, used for back-filling drains and so on; standard-size ballast for re-use in the track; small-size ballast for use in tunnels; chippings, used for measured shovel packing of sleepers.

Pond Water Circulated

The large volume of water required for the operation of the washers is obtained by pumping from an adjacent pond. After passing through the machines the water, in the form of a fine sludge containing all the dirt washed out of the ballast, is conveyed by pipeline to a pump which discharges into a settling tank at one end of the pond. Thus the water returned to the pond is relatively clean.

An example of the value of this process is illustrated by the recent re-ballasting of Totley tunnel, London Midland Region. The total quantity of ballast involved was about 25,000 tons. Each weekend, over a period of several months, about 1,500 tons of dirty ballast was removed from the tunnel by means of mechanised excavators, loaded into wagons, and conveyed to Sandiacre. This was washed during the week and returned to the tunnel for re-use the following weekend.

Grab feeding hopper with spent ballast for washing and grading. Conveyors can load wagons with clean ballast direct from washing machines

ROLLING STOCK BUILDERS COLLABORATE TO SUPPLY S.A.R.—The Directors of the Boards of Union Carriage & Wagon Co. (Pty.) Ltd., Nigel, Transvaal, South Africa, and Metropolitan-Cammell Carriage & Wagon Co. Ltd., Birmingham, have announced that an agreement has been signed whereby the two companies will collaborate in the supply of railway rolling stock for the South African Railways. This follows the acquisition by Metropolitan-Cammell of a substantial shareholding in Union Carriage including that previously held by Leyland Motors Limited. Union Carriage & Wagon Co. Ltd. was registered in 1957 and is a subsidiary of Commonwealth Engineering Co. Ltd., rolling stock builders of Sydney, Australia, which retains a majority shareholding. The Budd Company of Philadelphia, manufacturers of stainless steel passenger cars, is also a major shareholder. The effect of this agreement will be to make it possible for Union Carriage to use the knowledge and experience of Metropolitan-Cammell in the South African market in the design and building of passenger rolling stock, coupled with the resources already available from Australia and U.S.A. in the techniques of steel carriage construction.

RAILWAY NEWS SECTION

PERSONAL

Mr. S. W. Smith, Traffic Assistant to the Divisional Traffic Manager, London, London Midland Region, British Railways, has been appointed Divisional Traffic Manager, Manchester.

Mr. P. C. Neogi, Chief Engineer, South Eastern Railway of India, who, as recorded earlier this year, has been appointed the first Director General, Research, Design & Standardisation, Ministry of Railways, India was born in 1906. He was educated at the Bengal Engineering College, Siddpore, from where he graduated in Civil Engineering in 1928. Mr. Neogi joined the North Western Railway in 1929, as Assistant Executive Engineer. After seven years on open line, he was posted to the Bridge Department, in the same capacity, in 1937. He was appointed Executive Engineer in 1942, and was sent on deputation to the doubling of the Assam Railway in 1943. He returned to the Western Railway, in 1945, as Executive Engineer (Bridges), and later became Divisional Engineer, Delhi, 1946-47. He was appointed Deputy Chief Engineer, Assam Rail-Link Project in 1948, and, later the same year, transferred to the Oudh Tirhut Railway, as Deputy Chief Engineer (Bridges). In 1954 he moved to the Eastern Railway, as Deputy Chief Engineer, and was promoted to be Divisional Superintendent, Sealdah, in 1954. Mr. Neogi became Chief Engineer of the newly-formed South Eastern Railway in July, 1955. He took up his present appointment in April this year.

Mr. G. W. Anson, District Operating Superintendent, Glasgow (South), Scottish Region, British Railways, has retired.

Mr. Saradindu Sen, B.Sc.(Eng.), M.I.R.S.E., Chief Signal & Telecommunication Engineer, of the Northern Railway, India, who, as recorded recently, has retired, was born in Calcutta in 1904. Mr. Sen graduated, with honours, from the University of London, obtaining Diploma in Engineering from King's College, London. He started his signalling career in 1923, as an apprentice block-signal inspector on the Eastern Bengal Railway. Later he received practical training at the Chippenham Works of the former Westinghouse Brake & Saxby Co. Ltd. In 1929 he re-joined the Signal Department of the Eastern Bengal Railway. In 1930, he moved to the Madras & Southern Marhatta Railway as an Assistant Signal Engineer and, in 1949, became Deputy Chief Engineer (Signals). In April, 1952, he was appointed the first Chief Signal & Telecommunication Engineer of the then newly-formed Northern Railway. Later in 1952 Mr. Sen was a member of the Railway Operating & Signalling Experts' Group which visited a number of countries under the auspices of the Economic Commission for Asia & the Far East, and the United Nations Technical Assistance Administration. After a short assignment as the Chief Signal & Telecommunication Engineer, Southern Railway, he returned to the Northern Railway in 1953 in the same capacity. In October, 1954, he was appointed Signalling Lecturer, United Nations Railway Training Centre, Lahore, Pakistan. He returned to Northern Railway in 1956. Mr. Sen became the first Director, Signalling & Telecommunication, Indian Railway Board, in 1957. In 1958 he again returned to the Northern Railway as Chief Signal & Communication Engineer.

Mr. D. A. Harris, Assistant (Maintenance) in the Chief Civil Engineer's Office, Southern Region, British Railways, has been appointed District Engineer, Bangor, London Midland Region.

Mr. P. C. Neogi

Appointed Director General, Research, Design & Standardisation, Ministry of Railways, India

Mr. Saradindu Sen

Chief Signal & Telecommunication Engineer, Northern Railway, India, who has retired

Mr. R. P. M. Wormal, Assistant Divisional Shipping Manager, Dover, has been appointed Divisional Shipping Manager, Dover. He succeeds Mr. A. J. Hemens, who retires on December 31.

Mr. R. A. Savill, Assistant to the Commercial Officer (Mineral), North Eastern Region, York, British Railways, has been appointed District Commercial Officer, Sheffield, Eastern Region, from December 31.

Brigadier C. A. Langley, Chief Inspecting Officer of Railways, Ministry of Transport, is visiting India. He left London by air on November 27, for New Delhi and Simla, where he is to discuss safety problems and other railway matters with the Chief Government Inspector of Indian Railways and officials of the Ministries of Railways, Communications and Scientific Research. He will also attend the Meeting of the Permanent Commission of the International Railway Congress Association in New Delhi, reference to which was made in our November 20 issue.

Mr. J. E. W. Morecroft, Assistant Audit Accountant, Western Region, British Railways, has been appointed Audit Accountant. He succeeds Mr. R. H. Ferdinand, who has retired after 51 years' service.

Mr. A. Baker has been appointed Signal & Telegraph Engineer, Rhodesia Railways. He succeeds Mr. E. W. Dennison, who has gone to Australia.

Mr. H. L. Ellis, Secretary of the Western and Southern National Omnibus Companies Limited, has been appointed General Manager of these companies with effect from January 1, 1960.

Captain H. J. Pellow, Assistant Dockmaster, Southampton, British Transport Docks, has been appointed Dockmaster at that port. He succeeds Captain P. A. Morgan, who will retire on January 1.

Mr. James Dewar, Assistant to the District Operating Superintendent, Bruntisland, Scottish Region, British Railways, has been appointed District Operating Superintendent there. He has recently been occupying this position in a temporary capacity.

Mr. P. Murdoch, Divisional Shipping Manager & Harbourmaster, Newhaven, B.T.C. Docks, has been appointed Docks Manager, Middlesbrough & Hartlepools, in succession to Mr. T. S. Roberts, who, as already recorded, has been appointed Chief Docks Manager, Hull Docks.

Mr. J. Lauchlan has been appointed Chairman of Craven Brothers (Manchester) Limited. He is Managing Director of the company.

Transport Users' Consultative Committees

The following appointments to Area Transport Users' Consultative Committees have been announced:

London Area and East Anglia Area.

Mr. J. Hancock, a nominee of the British Transport Commission, to be a member of the London Area Committee until February 28, 1962, and of the East Anglia Area Committee until April 30, 1960. Mr. Hancock is Commercial Officer, Traffic Headquarters, Eastern Region, British Railways.

South-Western Area.

Mr. H. Picken, a member of Exeter City Council and Chairman of its Transport Committee, to represent local authorities until July 31, 1962.

Wales & Monmouthshire.

Miss Olive Turpin, County Organiser, Denbighshire, Women's Voluntary Service, to be an additional member until July 31, 1962.

Mr. Bernardo J. Loitegui has resigned as Under Secretary of Transport in the Argentine Government, and has been succeeded by Mr. Ricardo A. Ogueta.

Argentine Railway Appointments

The following appointments have been made on the Argentine State Railways :

General Urquiza Railway.

Mr. A. F. S. Lewis to be Administrator.

Mr. A. Weber to be Acting Chief of the Mechanical Department.

General Roca Railway.

Mr. H. H. Vilaseca to be Administrator.

General San Martin Railway.

Mr. A. A. Vilas to be Administrator.

Mr. Beltrán Laguyás to be Chief of the Way & Works Department.

General Mitre Railway.

Mr. N. Ferramola to be Administrator.

The Late Mr. Frank Grundy

The memorial service to the late Mr. Frank Grundy, Chief Traffic Officer, British Railways Central Staff, British Transport Commission, was held at St. Marylebone Parish Church, London, on November 26. It was conducted by the Rector, the Reverend F. Coventry, and the lesson was read by Mr. T. H. Hollingsworth, Traffic Adviser, B.T.C. General Staff. The organ was played by Mr. T. V. Nicholson, Operating Officer (Temporary), British Railways Central Staff. In addition to family mourners, the following were among those who attended:—

Members of the British Transport Commission.

Sir John Benstead (also representing Sir Brian Robertson), Messrs. K. W. C. Grand, J. Ratter, R. F. Hanks, T. H. Summerson.

General Staff of the Commission.

Messrs. S. B. Taylor, T. H. Hollingsworth, D. Murray, B. X. Jessop, A. R. Dunbar, J. E. M. Roberts, D. Robertson, J. H. Brebner, R. C. Bond, H. A. Chapman (also representing Mr. M. H. B. Gilmour), D. S. M. Barrie, M. A. Cameron, F. R. Stockdill, D. M. Dear, F. T. Gray, J. W. Read, B. T. Beken (also representing Mr. J. L. Harrington), J. Cooke, Miss B. P. Glutron.

Services of the Commission.

Messrs. W. W. Wood (also representing Mr. A. C. West), C. C. Inglis, T. M. Herbert, C. E. R. Sherrington.

British Railways Central Staff.

Messrs. A. A. Harrison (also representing Mr. J. R. Pike), E. A. W. Dickson, E. J. Vipond, R. Thompson, L. B. Marson, T. V. Nicholson, M. C. K. Richins, C. R. Wade, D. A. Lamb, J. W. Dickinson, J. E. R. Harwood, H. Leyshon, C. A. Pass, A. H. J. Turner, Miss B. F. Morgans, Messrs. C. W. King, A. W. Woodbridge, J. A. Broughall.

Messrs. H. L. Ballard, W. H. Chester, K. C. Clarke, A. E. Green, O. T. F. Hoppé, R. W. Langton, E. F. G. Lloyd, C. A. Norman, H. I. Parker, W. C. Rutherford. Misses C. Bremeyer, A. H. Beck, N. E. Elwell, M. E. E. Foote, N. Raisin, L. P. Terrell, M. E. Tuley.

Railway Clearing House.

Messrs. W. S. Cutler, A. F. Smith.

Eastern Region, British Railways.

Messrs. H. C. Johnson, S. G. Hearn (also representing Messrs. A. W. Tait and A. J. White), Dr. J. Sharp Grant, Messrs. B. T. Randall, E. D. Trask, H. Hoyle.

London Midland Region, British Railways.

Messrs. David Blee (also representing the Institute of Transport), A. J. Pearson, E. W. Arkle, R. L. E. Lawrence, A. E. C. Dent, E. G. Brentnall, G. E. Curtis (also representing Mr. H. Bullough), E. W. E. Preece (also representing Mr. F. Marsden), H. S. Turrell.

Commercial Investigation Bureau.

Messrs. L. Foden, W. J. Cooper.

North Eastern Region, British Railways.

Messrs. H. A. Short, L. S. Sproat (also representing Mr. F. C. Margetts), S. Cott (also representing J. H. M. True and K. N. Sidebotham), S. F. Hunt.

Scottish Region, British Railways.

Mr. G. W. Stewart (also representing Mr. James Ness).

Southern Region, British Railways.

Messrs. C. P. Hopkins, D. McKenna, S.A. Fitch, F. D. Y. Faulkner, T. E. Jackson.

Western Region, British Railways.

Messrs. R. F. Hanks (also representing Mr. J. R. Hammond), C. J. Rider, C. W. Powell, C. A. Galley, J. Taylor, E. R. Thomas, B. Seymour, W. H. Hawkeswood, J. Berry.

London Commercial Service.

Messrs. W. E. Yates, C. G. Cooke.

British Road Services.

Messrs. Harold Elliott, G. Maclean.

British Transport Docks.

Sir Robert Letch.

British Transport Waterways.

Mr. H. P. Wray.

British Transport Hotels & Catering Services Division.

Mr. T. H. Baker (also representing Mr. F. G. Hole).

London Transport Executive.

Messrs. F. G. Maxwell, Alex J. Webb, R. Postgate.

Retired Railway Officers.

Messrs. H. R. Barrett, A. E. Barrs, W. P. Bradbury, R. Burgoyne, A. L. Castleman, R. H. Hacker, P. J. Jarvis, Gilbert Matthews, A. W. Norman, W. B. Richards, R. T. Scarfe, H. H. Swift, E. Thompson.

Others present.

Messrs. F. D. M. Harding (Pullman Car Co. Ltd.), Frank W. Crews (Institute of Transport), W. T. James (British Electric Traction Co. Ltd.), Col. D. MacMullen (Ministry of Transport), Mr. L. G. Burleigh (Traders Co-ordinating Committee on Transport).

Mr. J. Roy Rewell, Assistant Chief Traffic Manager, Victorian Railways, has been appointed Chief Traffic Manager. He succeeds Mr. T. R. Collier.

Mr. D. D. Lee, Principal Assistant in the General Secretary's Department, Transport Salaried Staffs' Association, has been appointed Assistant Secretary at T.S.S.A. Head Office.

Mr. W. Dendy, Assistant to the District Operating Superintendent, Newcastle, North Eastern Region, British Railways, has been appointed Assistant District Passenger Superintendent, Newcastle.

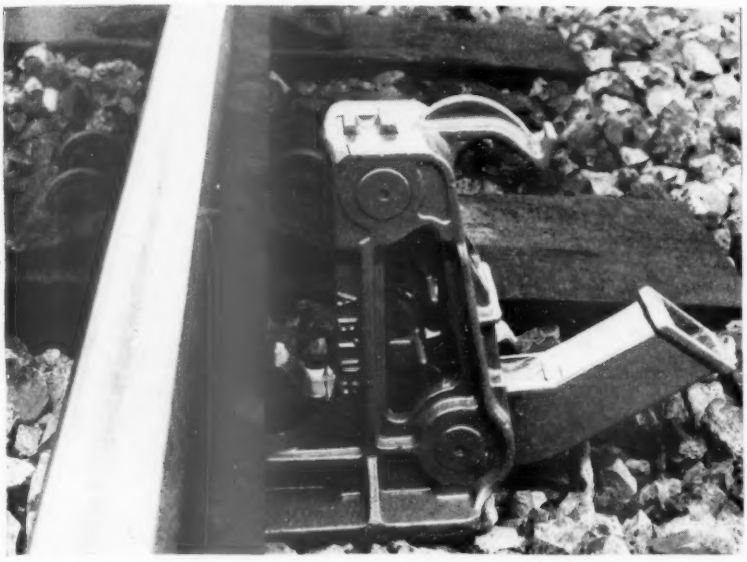
We regret to record the death, at the age of 90, of Mr. E. Stephenson, Works Manager, Shildon Wagon Works, London & North Eastern Railway, from 1923 to 1934. He had completed more than 52 years of railway service.

Mr. A. H. Hird, the Chairman of Cooke, Troughton & Simms Limited, has resigned from the board of that company and from his office as Chairman because of his other duties within the Vickers Group. Mr. R. P. H. Yapp, a Director of Vickers Limited, succeeds Mr. Hird as a Director & Chairman of the company.

We regret to record the death, on November 22, of Mr. T. H. Seaton, Assistant Engineer (Maintenance), London & North Eastern Railway, 1946-47. The funeral service was held on November 27, at the Baptist Chapel, Burnham-on-Crouch, followed by cremation at Southend. The funeral service was attended by Mr. R. E. Sadler, Assistant Civil Engineer (Modernisation), Eastern Region, British Railways, and Mr. K. T. Tredinnick, District Engineer, Stratford.

The Council of the Institution of Locomotive Engineers has appointed two additional Overseas Advisory Representatives in Australia. The intention of the appointments is to advance the science and practice of locomotive engineering—the main object of the Institution—in that country. Mr. C. A. Cardew, Assistant C.M.E., New South Wales Railways, has been appointed by the Council as Overseas Advisory Representative to promote the interests of the Institution in New South Wales. Similarly Mr. J. L. T. Ripp, an officer in the C.M.E's Department of the Western Australian Government Railways, Midland Junction, has been appointed as Overseas Advisory Representative in Western Australia. In Victoria the office of Overseas Advisory Representative has been held for several years by Mr. H. A. Johnson (of British Timken Limited), but on his recent retirement Mr. G. F. W. Brown, Commissioner for Railways in Victoria, has accepted the Council's invitation to succeed him.

NEW EQUIPMENT AND PROCESSES



Track Jacks

AN all-purpose ratchet track jack for railway maintenance work is in course of manufacture. It incorporates two important features: a low rack bar toe, which obviates the removal of ballast when positioning under a rail, and allowance for wheel flangeway clearance between the head of B.H. section rails and the jack body when this is operated from inside the rail. When used on F.B. section rail this clearance is automatically increased by virtue of the width of the bottom flange, which provides ample clearance between the head of the rail and the jack, whether this is positioned inside or outside the rail when lifting for packing ballast and so on.

Further details can be obtained from the manufacturer, Abtus Limited, Vandon Court, Petty France, London, S.W.1.

Fitting for Reflector Lamps

THE R.7720, a new and inexpensive fitting for the Philips mercury fluorescent reflector lamp, has been designed to provide protection against industrial hazards. It provides complete coverage for the top of the lamp, but does not interfere with light distribution. It is light in weight and simple to install. When used in combination with reflector-type mercury fluorescent lamps it makes possible a highly economical lighting installation under "dirty" atmospheric conditions. Price is £2 5s.

Further details can be obtained from Philips Electrical Limited, Century House, Shaftesbury Avenue, London, W.C.2.

Magnets for Lifting Rails

THE accompanying illustration shows a new type of magnet designed specifically for the lifting of railway lines or steel bars. Used in pairs on a 30-ft. spreader bar, they will lift up to 17 light rails at a single hoist.

Further details can be obtained from Brookhirst Igranic Limited, Bedford.

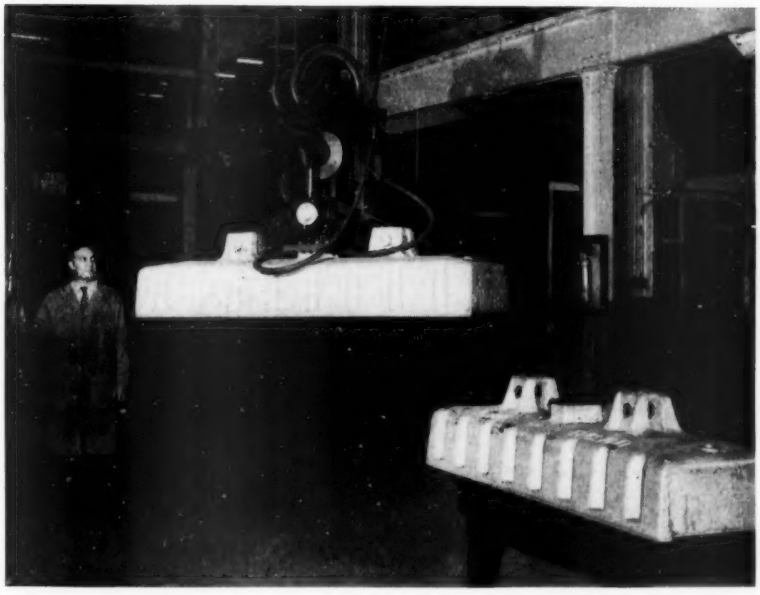
wear, whether by continuous flexing because the seal is unseated, or by damage to the sealing lips. Usually this wear is minimised by the use of vents to allow fluid to escape from behind the seals.

The Hallprene seal can be mounted centrally in a groove on the piston spigot, filling the diametral clearance between spigot and cylinder. It facilitates more economical design of double-acting pistons, and allows for longer operation before servicing. It is available in a wide range of standard sizes.

Further details can be obtained from the manufacturers, Hall & Hall Ltd., Oldfield Works, Hampton, Middlesex.

Indexing Chuck for Lathe

THE Herbert Four-Position Indexing No. 2 Quadra-Chuck makes it possible to reduce chucking times when machining quantities of small multiple-end components of non-ferrous metal such as elbows, tees, and crosses, in a Herbert No. 2 Flashcap turret lathe. The chuck grips the material in such a way that the latter can be indexed 90 or 180 deg. by a foot pedal and pneumatic-

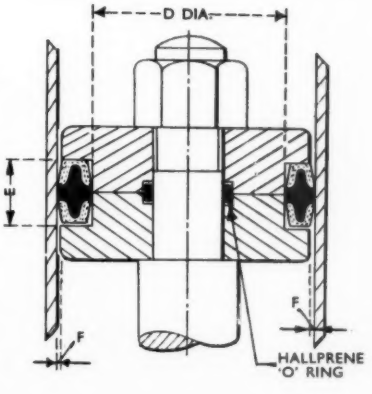


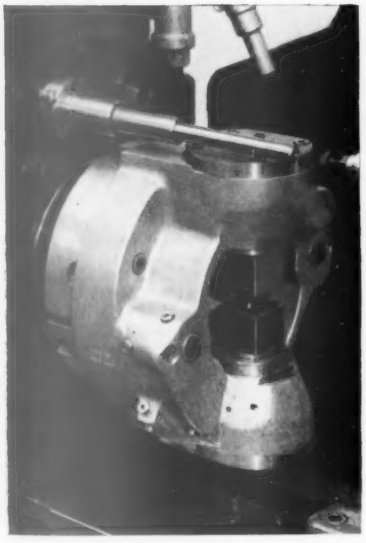
Double-Acting Fluid Seal

THE Hallprene patent double-acting fluid seal is claimed to eliminate many of the difficulties encountered in the design and operation of double-acting hydraulic pistons.

Conventional practice in sealing double-action mechanisms is to use two seals back to back; one seal operating on the inward and the other on the outward stroke. The difficulty arises of dealing with fluid accumulations between these seals; however efficient they may be in resisting leakage under pressure, there is generally some fluid "creep" between the piston and the seal.

The pocket of fluid thus formed between two seals can cause rapid wear of the seals if it is allowed to remain. It moves from one seal to the other as the piston reciprocates, so that both seals are subject to excessive





hydraulic mechanism giving positive selection of the face to be machined without stopping the lathe spindle.

With the Quadra-chuck in use, only one chucking is necessary to machine all ends of a component. Also, where all ends are to be the same, it is claimed that total machining time may be further reduced by performing each single operation on all ends before indexing the turret. The extreme rapidity with which the component can be indexed by the chuck makes this possible.

The chuck jaws are mounted on the ends of hydraulic cylinder pistons which permit their rotation. They have a maximum stroke of ⅜ in. each and can grip components on diameters of up to 1½ in. The chuck will accommodate work which can be indexed in a radius of 2½ in. Tenon-located jaw blanks must be machined to suit the work piece or can be supplied to suit specific requirements.

When the indexing chuck is not required it can be removed from the spindle with its two draw rods. Then the self-contained air-control mechanism and rotating cylinder may be used to operate normal air jaw chucks.

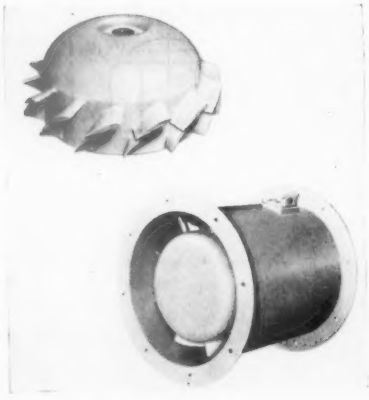
Further details may be obtained from Alfred Herbert Limited, Coventry.

Axial Fan Blade Design

UNDER an agreement with General Dynamics Electric Boat Division, Groton, Connecticut, new patented designs of axial fans are to be produced and marketed in this country under the trade name of Ax-slot.

A special slotted blade formation provides the means of boundary layer control This offers the choice of higher efficiency or higher pressure ratios, or a combination of both. Boundary layer control also ensures that, with higher pressure ratios and minimum losses from turbulence and blade friction, the fan size, running speed, airborne noise, and structure-borne vibration are all reduced.

Further details can be obtained from Keith Blackman Limited, Mill Mead Road, London, N.17.



Woodworking Machines

A SAW bench and an improved vertical band re-saw are among new Robinson wood-working machines. The first is a 20 in. model with rising and falling spindle, type YA/T. Maximum depth of cut is 7 in. Size of table is 3 ft. x 3 ft. 1½ in., and the motor is mounted on the saw yoke. This is claimed to be a useful and versatile machine for accurate sawing of all kinds. Emphasis has been laid on strength and on simplicity of saw mounting and packing and of operation and maintenance. The extra-large table is lipped to support a tailing-off extension, grooved for a cross-cutting and mitring gauge, and is provided with an outer support rail at the front.

The XF/T 48-in. vertical band re-saw, is an improved model incorporating power-driven vertical and horizontal feed rollers, rear outer feed roller for return of timber to the operator; pivot-mounted top saw wheel with sensitive saw straining device; power rise and fall to the top saw wheel, and power traverse to the fence and vertical feed rollers. Feed rates are up to 120 ft. per min.

Further details of both these machines can be obtained from the manufacturer, Thos. Robinson & Son Ltd., Rochdale.

Price Reduction

RESEARCH & Control Instruments announces that the price of the Philips Valve Voltmeter (Type CM 6012) has been reduced from £94 to £70.

Solderless Pipe Fittings

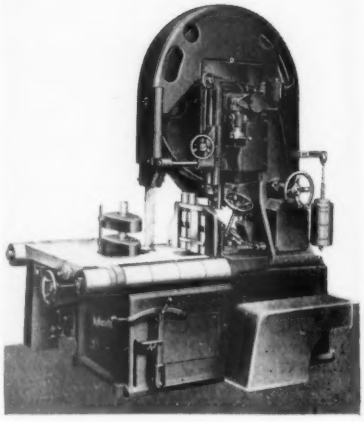
THE Enot range of solderless pipe fittings has been enlarged by a considerable number of additions. Also, the manufacturer's nylon tube is now available in six colours in all sizes up to ½ in. o.d. Service is from stock.

Further details can be obtained from Benton & Stone Limited, Aston Brook Street, Birmingham, 6.

Sanding Attachment

THE "Swirlaway" is a sanding attachment for electric drills which incorporate a flexible ball joint. This eliminates swirls and prevents the gouges and scars commonly caused in power sanding by the drill "running-away." It enables the sanding disc, which is on a rubber faced metal base, to be used flat, giving a larger sanding area than conventional attachments.

The employment of the flexible ball joint, which is housed in nylon, is also claimed to take much of the labour out of electric drill sanding and permit control with one hand. No pressure is required and a fine finish is possible. The unit can be rigidly fixed when in use on narrow edges.



Cost of a "Swirlaway" pack, which includes three aluminium oxide sanding discs, is 25s. Replacement discs are sold in packets of five, in a choice of grades at 1s. 6d. a packet. Silicon carbide discs for metal working are also supplied. Discs can be cleaned with a piece of foam rubber.

Further details can be obtained from the manufacturer, Stanley Works (G.B.) Limited, Rutland Road, Sheffield, 3.

A.E.I. Electric Locomotive for British Railways

Handing over by Lord Chandos of 3,300-h.p. 25-kV. 50-cycle a.c. locomotive to Lord Rusholme

THE first of 25 a.c. electric locomotives to be supplied by the British Thomson-Houston Co. Ltd., now incorporated in the Associated Electrical Industries Traction Division, to the London Midland Region of British Railways was handed over by Lord Chandos, Chairman, Associated Electrical Industries Limited, to Lord Rusholme, Chairman, London Midland Area Board, British Transport Commission, at Sandbach on November 27. This locomotive is also the first of those to be used for main-line service between London, Manchester and Liverpool. It is designated British Railways type "A," has a continuous rating of 3,300 h.p., and is designed primarily for operation at a line voltage of 25 kV. 50 cycles a.c.

In handing over the locomotive, Lord Chandos expressed his regret that Mr. S. B. Warder, Chief Electrical Engineer, British Railways, Central Staff, could not be present at the ceremony. On the other hand, he said, his regret was tempered by knowing that Mr. Warder was visiting India, to give his advice on the subject of electrification.

Lord Chandos then expressed his appreciation of the confidence which British Railways had shown in placing the very large orders with A.E.I. He believed that the confidence would not prove to be misplaced, and said that he and his colleagues would do everything to see that British Railways was satisfied with what it was getting.

In accepting the locomotive, Lord Rusholme said that the introduction of electric traction on a wide scale in busy areas would mean that the steam locomotive, after nearly 130 years' supremacy, would largely disappear. On behalf of Sir Brian Robertson and the British Transport Commission, he offered his congratulations to Lord Chandos, his colleagues and staff, who had worked so hard to complete the locomotive.

Completion of Major Schemes

Within the next two years, he said, no less than six electrification schemes would be completed, and all of them would be carried out on the alternating current system. As a Lancastrian, he was proud that the North-West was in the forefront of these developments. They included the first stages of the electrification of two main lines, of suburban routes in and around Glasgow, and to the north and east of London. The first of the main line routes to be completed would be the one from Manchester, of which a part, including the line at Sandbach, was already electrified.

The line to Crewe would be fully operational by next September. Work had also begun on the line between Liverpool and Crewe, and this would be electrified in 1961. Conversion of these routes would complete the first and second stages of the main line electrification to London, which was to be extended southwards from Crewe. All available electrification resources were being concentrated upon the major scheme. By doing so, he hoped that by the end of 1964 electric expresses would be linking London with Birmingham, Manchester, and Liverpool.

The following guests were also present at the ceremony :—

British Transport Commission General Staff : Mr. R. C. Bond, Technical Adviser;

British Railways Central Staff : Messrs. J. F. Harrison, Chief Mechanical Engineer; C. W. King, Chief Civil Engineer; J. A. Broughall, Electrical Engineer, Development (also representing Mr. S. B. Warder, Chief Electrical Engineer); E. S. Cox, Mechanical Engineer, Development;

London Midland Region : Messrs David Blee, General Manager; E. W. Arkle, Director of Traffic Services; A. E. Robson, Chief Mechanical & Electrical Engineer; F. L. Lambert, Chief Electrical Project Officer; J. Royston, Divisional Traffic Manager; R. W. Crawshaw, Public Relations & Publicity Officer;

Eastern Region : Messrs. E. D. Trask, Assistant to General Manager (Special Duties); T. C. B. Miller, Chief Mechanical & Electrical Engineer;

North-Eastern Region : Mr. M. G. Burrows, Chief Mechanical & Electrical Engineer;

Scottish Region : Mr. M. S. Hatchell, Chief Mechanical & Electrical Engineer;

Southern Region : Mr. H. S. Smythe, Electrical Engineer (representing Mr. W. J. A. Sykes, C.M. & E.E.);

London Transport Executive : Mr. R. I. D. Arthurton, Assistant Mechanical Engineer (Development);

Messrs. H. H. C. Barton, Messrs. Merz & McLellan; R. J. Brearley, Scientific Liaison Officer, National Research Council of Canada; F. P. Buckley, Agent General, N.S.W.G.R.; G. R. Curry, Director, L.A.M.A.; W. T. Hallworth, General Secretary, A.S.L.E.F.; N. T. Howard, Acting Agent General, Victoria; F. E. Hough, Messrs. Freeman, Fox & Partners; J. T. Hudson, Assistant Advisory Engineer, New Zealand Railways; J. W. G. Kershaw, Westinghouse Brake & Signal Co. Ltd.; R. P. Marriott, Advisory Engineer, New Zealand Railways; C. Muirhead, English Steel Castings Corporation Limited; O. S. Naylor, Agent, Rhodesia Railways; J. S. E. Rundle, B.E.A.M.A.; Julian Tritton, Messrs. Rendell Palmer & Tritton;

Birmingham Railway Carriage & Wagon Co. Ltd. : Sir Bernard D. F. Docker, Chairman & Managing Director; Messrs. J. Arthur Reid, Assistant Managing Director; Mr. C. H. N. Pierce, Director & General Manager; Mr. C. L. Trask, Director & London Office Manager;

British Thomson-Houston Co. Ltd.: Mr. W. S. Steel, Director & General Sales Manager ;

Metropolitan-Vickers Electrical Co. Ltd.: Dr. C. Dannatt, Managing Director; Messrs. C. H. Flurscheim, Director & Chief Electrical Engineer; R. H. S. Turner, Director & Works Manager; J. Dummelow, Manager, Publicity Department;

A.E.I. Traction Division : Messrs. F. Whyman, Director & General Manager; W. B. G. Collis, Commercial Manager; G. R. Higgs, Engineering Manager; J. H. Cansdale, Executive Member, Rugby; J. C. Kubale, Manager, Metropolitan-Vickers-GRS; J. C. Way, Sales Manager, Manchester; J. O. Sims, Sales Manager, London; H. Newsam, Chief Engineer, Traction Motor; W. T. Gray, Chief Engineer, Traction Control; M. W. T. Rees, Chief Engineer, Rugby;

A.E.I. Heavy Plant Division : Dr. J. C. Read, Manager, Rectifier Engineering Department;

A.E.I. Motor and Control Division : Mr. C. F. Gimson, Assistant Chief Engineer;

A.E.I. Export Limited : Messrs. A. W. Barford, Manager, African Area; W. C. Scott, Manager, European Area; W. A. Hardman, Manager, Eastern Area.

Presentation of Colours to R.E. (A.E.R.) Railway Unit

Mr. H. A. Short, General Manager, British Railways, North Eastern Region, recently presented new colours to Major T. F. Cameron, the Officer Commanding 153 Railway Squadron, Royal Engineers (Army Emergency Reserve). The squadron is sponsored by the Region and the officers and men, who are volunteers, are drawn almost entirely from North Eastern Region staff. The new flag, to be flown at annual camp and on other suitable occasions, is the gift of the North Eastern Region to its own squadron.

The design includes the British Railways badge on a tangerine background (the Regional colour) in a separate panel as the centre piece, and the designation of the squadron is shown in white letters across the

Lord Rusholme switching on the locomotive from a special remote control unit. On the left are Mr. David Blee and Lord Chandos

general background of the flag which is in the Royal Engineers colours of red and blue. The presentation of regional colours has the approval of Sir Brian Robertson, Chairman of the British Transport Commission, as Honorary Colonel of the R.E. (Transportation) A.E.R.

The presentation took place at York before a representative gathering of past and present members of 153 Railway Squadron. Lt.-Colonel R. A. Savill, Commanding Officer of 19 Railway Regiment, R.E., also was present.

Mr. Short, who himself served in the Royal Engineers (Supplementary Reserve) for several years, in making the presentation paid tribute to the work done during the last war by the various units of the Supplementary Reserve in which railwaymen served in all parts of the world. He pointed out that the strength of 153 Squadron was now 286. He was proud that his Region was the first to present new colours to its squadron, and he expressed on its behalf good wishes to Major Cameron, his officers, and men.

Bulk Handling of Cement at Bow Street, Western Region

Facilities for the handling of bulk cement have been introduced at Bow Street Station, near Aberystwyth, by British Railways, Western Region.

Having learned that the Aberthaw & Bristol Channel Portland Cement Co. Ltd. had secured a contract to supply a very large tonnage of bulk cement for the Rheidol hydro-electric scheme, British Railways quickly arranged discussions on the best method of meeting the requirements of the contractors on site. All work was completed in time to deliver cement as scheduled.

Rail transit is by bulk wagons of 20 tons capacity fitted for discharge by air pressure. Much of the cement is delivered to site in tipping road vehicles.

To avoid spillage during discharge from the railway wagon and to provide sufficient storage to avoid delay in deliveries, a 90-ton overhead silo was erected in Bow Street Goods Yard. Road vehicles are loaded from the silo by assisted gravity.

Thompson & Taylor Limited produced a portable air compressor rated at 10 lb. per sq. in., 285 cu. ft. per min., capable of discharging cement from the railway wagon to a height of about 45 ft.

Work necessary at the station included strengthening of roads and overhauling of weighing facilities.

Silo and bulk equipment for cement at Bow Street, near Aberystwyth

Re-opening of Mechanics' Institute at Swindon

Mr. R. F. Hanks, Chairman, Western Area Board, British Transport Commission, on November 20 re-opened the Mechanics' Institute of British Railways, Western Region, at Swindon. The Institute was erected by the New Swindon Improvement Company, founded in 1853 by the Works employees who took shares in the undertaking. When the company was wound up, the premises were vested in trustees. In 1956 it was agreed to merge the Institute and the Swindon Staff Association branch.

Mr. R. A. Smeddle, Chief Mechanical & Electrical Engineer, Western Region, and President of the Institute, welcomed Mr. Hanks, who was accompanied by Mr. J. R. Hammond, General Manager; Mr. C. T. Roberts, Principal Assistant Mechanical & Electrical Engineer and Chairman of the Institute; Mr. S. G. Ward, Regional Establishment & Staff Officer; Mr. J. W. J. Webb, Regional Accountant; Mr. A. W. J. Dymond, Supplies & Contracts Manager; Mr. C. J. Rider, Public Relations & Publicity Officer; Mr. H. E. B. Cavanagh, Regional Architect; and Mr. J. D. Swain, Regional Treasurer. Mr. H. R. Chubb, Regional Welfare Officer, was unable to attend because of illness.

Former officers present included Mr. F. W. Hawksworth, Chief Mechanical Engineer; and Mr. W. N. Pellow, Motive Power Superintendent.

Mr. Hanks recalled his period of training at Swindon when he became a member of the Mechanics' Institute. He spoke of Swindon's pride in the design and building of locomotives, both steam and diesel-hydraulic.

Mr. Hammond pointed out that the Institute was now one of the finest on the Region.

Mr. C. T. Roberts presented Mr. Hanks with life membership of the Institute and the ceremony ended with the unlocking of the door of the new lounge. The key was handed to Mr. Hanks by Mr. J. Pattison, the building contractor.

Institute activities in progress witnessed by Mr. Hanks included a concert by railway choirs and orchestra.

Mr. R. A. Smeddle (speaking) with other officers of the Western Region at the re-opening of the Mechanics' Institute at Swindon

The illustration shows (left to right) Messrs. J. Prosser, Vice-Chairman of the Institute; Mr. C. T. Roberts; Mr. R. F. Hanks; Mr. R. A. Smeddle; Mr. J. R. Hammond; Mr. J. W. J. Webb; Mr. C. J. Rider; and Mr. A. W. J. Dymond.

Transportation Club Dinner

Mr. D. H. Handover, Chairman of the Transportation Club, was in the chair on November 26, at the last dinner of the Transportation Club, held at 44, Wilton Crescent, S.W.1. Forty-two Members and their guests attended, including Mr. K. W. C. Grand, past Chairman of the club.

Mr. Handover reminded his audience of the action taken by the British railway companies during the last war to provide a social centre and a meeting place between officers of transportation units of the Canadian and U.S.A. armed forces and others in the world of transport. This had resulted in the opening of the Transportation Club at 44, Wilton Crescent on January 1, 1943, by the late Sir Ronald Matthews, then Chairman of the Railway Companies Association and Chairman of the London & North Eastern Railway Company.

This, the last club dinner to be held in these premises, was a sad occasion. The club had done a great deal to promote understanding of each other's problems and good fellowship between those engaged in the management and operation of transport undertakings and others in the world of transport, including the suppliers of material.

They planned to re-open the club in the vicinity of Portland Place, and he hoped that officials of the British Transport Commission and of British Railways would give it their support. He welcomed the guests,

including Mr. Christopher Brunner, a Director of Shell-Mex & B.P. Limited, the guest speaker.

Mr. Brunner gave a brief review of the problems and activities of the oil industry, more particularly in connection with the development of diesel traction on British Railways and its effect on oil consumption and storage, and of world supplies of oil.

Reference was made by Mr. Brunner to the instructional film "The Diesel on Rail" made by his company in 1956 with the co-operation of British Railways and the manufacturers of diesel locomotives and engines. The film had been extensively used by British Railways in training its staff.

With the coming of diesel traction, the oil industry had a material stake as a fuel supplier to the railways. In addition, a healthy vigorous, and up-to-date transport system benefited industry and the community as a whole. For that reason the success of the British Railways modernisation plan would be welcomed as a major factor in the national prosperity in the next two or three decades, and beyond. The growth of oil consumption meant more business for the railways. Shell-Mex & B.P. Limited and its associates were already spending £4,000,000 a year on rail transport of their products, and would continue to use the railways for speed in the bulk carriage and direct movement of oil.

Mr. K. W. C. Grand expressed the thanks, of the club to Mr. D. H. Handover for his valuable work as Chairman.

Questions in Parliament

Alternatives to Closed Branch Lines

Mr. Hector Hughes (Aberdeen N.—Lab.) asked the Minister of Transport on November 17, what steps he was taking to maintain and develop communications in the north and north-east of Scotland as alternative to the branches which had recently been closed down in those areas.

Mr. Ernest Marples in a written answer: We have asked the Scottish Transport Council to examine this problem in the Highland area in consultation with the Highlands Panel. The Committee on Rural Bus Services in its study of the general problem will maintain close contact with the Council.

British Railways: Public Accountability

Mr. D. Price (Eastleigh—C.) asked the Prime Minister in the House of Commons on November 24 if he would put the B.T.C. directly under the Minister of Transport, "so that British Railways may be directly responsible to the House of Commons for their efficiency."

Mr. Macmillan: This would be a very drastic change, which would require new legislation. As regards the relationship between British Railways and this House, I would refer my hon. Friend to the answer I gave on November 12 to the Member for Ayr (Sir Thomas Moore).

[The answer referred to on November 12 was that the Leader of the House (Mr. R. A. Butler) proposed to discuss the matter with those concerned—Mr. Speaker and "the usual channels" (The Party Whips)].

Mr. Price: There is a good deal of dissatisfaction in the country, and also among people working on British Railways and customers of British Railways, about the present arrangement of answerability for this public service. Will the Prime Minister undertake to look at the matter again and also, in looking at it, to review the experience of war time, when we had a Minister of Transport, who, I understand, was prepared to answer questions in this House about some of the operations of our transport system.

Mr. Macmillan: Yes. I shall be glad to study this. I can only say that it is a very large issue and rather difficult to deal with by way of question and answer. It is the whole problem set by nationalisation.

Salaries of Nationalised Boards

Mr. John Hall (High Wycombe—C) asked the Prime Minister on November 24, whether he had yet given further thought to the question of appointing a committee of independent persons of high standing to review regularly the remuneration of Ministers of the Crown, members of boards of nationalised industries and other public servants of comparable status; and if he would make a statement.

Mr. Macmillan, in a written answer: I have considered the suggestion, but I do not contemplate at present the establishment of such a committee.

No Dismissals Through Branch Line Closure

Mr. Hector Hughes (Aberdeen North—Lab.) asked the Minister of Labour, on November 24, how many railway workers in the north and north-east of Scotland had been dismissed, suspended, or placed on short-time owing to the closing down of branch railway lines in those areas.

Mr. Edward Heath: None.

Mr. Hughes: Closing down of these lines cuts across the policy or alleged policy, of the Secretary of State for Scotland of encouraging industry in the north and north-east of Scotland. Will he, the Minister, consult with him and the President of the Board of Trade with a view to a policy not contradictory as between certain Ministers?

Mr. Heath: I have stated the position as far as past closures are concerned. Future proposals are still under discussion.

Flat Carriage Rate Refused

Mr. Forbes Hendry (Aberdeen West—U.) asked the President of the Board of Trade on November 26, whether, in view of the fact that it cost more to send paper from Scotland to London by rail than from Sweden to London by sea, he would consult with the B.T.C. regarding the early introduction of a flat rate for the carriage of paper within the United Kingdom, so as to ensure the continued prosperity of the Scottish paper-making industry after the "Outer Seven" Free Trade Area came into force.

Mr. Reginald Maudling, in a written answer: No.

Parliamentary Notes

Railwaymen Poorly Remunerated

Mr. Cyril Osborne (Louth—C.) in an adjournment debate in the House of Commons on November 25 complained of delays and losses by British Road Services. He wondered whether B.R.S. and the other nationalised transport undertakings were getting the best type of labour.

He also cited a delay on British Railways. The 3.20 p.m. train to London arrived at Leicester 20 min. late. It was necessary to change the engine, which took another 20 min. He was told that in the old days it was possible to change an engine in 4–5 min.

Mr. Charles A. Howell (Perry Bar—Lab.): Never.

Mr. Osborne: That is what I was told by people who ought to know.

Mr. Howell: I worked on the railway.

Mr. Osborne replied that he had got his information from an old railwayman. There was a feeling, justified or not, that there was no one present with drive and efficiency to organise things. No one took the business by the scruff of the neck and got the most efficient service. They left Leicester at 4.54 p.m. instead of 3.20 p.m. He asked the ticket inspector why things were so bad. He had said, "When I am 65, I shall have been working on the old Midland Railway for 51 years." Men like that ought not to be thrown out with a pension of 9s. 6d. This man had said to him, "How do you expect us to put our hearts into the job if you treat us in that way?" Mr. Osborne talked with an old man on Leicester Station while the engine was being changed. He said he was 74 years old, and had started when he was 14. The pension was so miserable that the old man did not feel that he dare retire. If men felt that they were not getting a fair deal, surely the best could not be expected from them.

The older servants in the transport world, Mr. Osborne added, feel that since nationalisation a new grade had been brought in, some of them call the grade "college boys," who had been put in over the heads of the practical men.

Reasons for Traffic Delays

Mr. John Hay, Joint Parliamentary Secretary to the Ministry of Transport, reminded the House of the constitutional position. The Minister of Transport was not responsible for the day-to-day management and administration of any B.T.C. undertaking. B.R.S. (Parcels) Limited was aware of delays in the peak period of the year—a dilemma common to all transport organisations—and wished to keep its plans to reduce delays and improve its organisation to avoid what might well be useful information to its private enterprise competitors.

Mr. Hay added that there had been exceptional pressure at Leicester—a quarter-of-a-million more packages were carried in the four-week period compared with the corresponding four weeks a year ago. There was also the question of attaching labels properly.

Mr. Wedgwood Benn (Bristol S.E.—Lab.) said that when Mr. Osborne made his comment about the college graduates he was referring to the one aspect, the premium apprenticeship scheme in which the B.T.C. was bringing university men into the service of transport. To try, on the basis of the delays of which he had heard were due to seasonal increases in traffic, to draw conclusions about wages and conditions and the promotion and educational scheme of the Commission, was unworthy.

Staff and Labour Matters

N.U.R. Wage Claim

A meeting of the Railway Staff National Council took place on December 3, at which the British Transport Commission gave its reply to the claim of the N.U.R. for a substantial increase in the rates of pay of railway salaried and conciliation staff.

A full report as to what transpired at the meeting will be given in our next issue.

LLANDUDNO & COLWYN BAY ELECTRIC RAILWAY LIMITED, RESULTS.—For 1958 the results of the Llandudno & Colwyn Bay Electric Railway Limited show a net loss of £1,711 (£69). Current assets are £1,580 (£5,205), liabilities £5,225 (£1,262).

INCREASED INDUSTRIAL PRODUCTION.—Industrial output in Britain increased in October, when it reached a peak 7-8 per cent higher than at the beginning of the year and 9 per cent higher than in October, 1958. The Government index of industrial production assesses the October figure at 114-115, against 100 in 1954, and 114 in September, 1959. The recovery is reported to be apparent in sections of heavy industry.

Contracts and Tenders

B.T.C. orders for electric train vehicles

The British Transport Commission has placed orders with British Railways for the construction of 648 electric train vehicles in the railway workshops at Doncaster, Eastleigh, Wolverton and York. For the Liverpool Street-Chingford-Hertford East-Bishop's Stortford line of the Eastern Region, 232 vehicles are to be built, 76 at Doncaster and 156 at York. For the Manchester-Crewe service of the London Midland Region, 60 vehicles are to be built at Wolverton, and a further 80 for the Liverpool-Crewe service. The remaining 336 are to be built at Eastleigh for the second phase of the Southern Region Kent Coast electrification scheme.

British Railways, North Eastern Region, has placed the following contracts:

Heenan & Froude Limited: dynamometer equipment for Darlington Locomotive Works

A Robinson Limited: earthworks and drainage at Newport New Marshalling Yard

Broom & Wade Limited: air compressors and ancillary equipment at Crofton Permanent Way Depot

S. H. Heywood & Co. Ltd.: electric lighting at Darlington Bank Top Station

Ransomes, Sims & Jefferies: one 1-ton battery-operated road mobile crane for use at Leeds Wellington Street Goods Depot

Duke & Ockenden Limited : supply of light boring rig and equipment for use in the Chief Civil Engineers Department.

The Special Register Information Service Export Services Branch, Board of Trade, has received calls for tenders as follow:

From French West Africa :

(*a*) 14 main-line diesel-electric locomotives

(*b*) 6 diesel-electric shunting locomotives

(*c*) 494 large capacity wagons.

The issuing authority and address to which bids should be sent is the Société Anonyme des Mines de Fer de Mauritanie(MIFERMA) 11, Boulevard Lannes, Paris 16. The closing date for items *a* and *b* is January 18, 1960, and for item *c*, January 21, 1960. The Board of Trade reference is ESB/27184/59.

From Greece :

44 turnouts, standard gauge, from S33 rails, with straight frog

6 turnouts, standard gauge from S33 rails, with curved frog.

The issuing authority is the Ministry of Finance, State Procurements Service, Office VII. The tender No. is 624. Bids should be sent to the Offices of States Procurements Service—SPS, 50 Socrates Street, 4th floor, Athens. Local representation is essential. The Board of Trade reference is ESB/-27589/59.

From India :

14 items of cylinders.

The issuing authority is the Director General of Supplies & Disposals. The tender No. is SR2/RGC/Cylinder/4736/ 1960-61/II. Bids should be sent to the Director General of Supplies & Disposals, Shahjahan Road, New Delhi. The closing date is December 22, 1959. The Board of Trade reference is ESB/27635/59.

From Burma :

6 firebox inside wrapper plates for D class to BR drg. No. S.4652 " A "

6 firebox tube plates for D class to BR drg: No. S.4651 " A "

6 Firebox inside back plates for D class to BR drg. No. S.4653 " A."

The issuing authority and address to which bids should be sent is the Director General, Union of Burma Purchase Board, St. Johns Road, Rangoon. The tender No. is IIIB/41/P & M. of 59-60. The closing date is December 21, 1959. The Board of Trade reference is ESB/27748/59.

From Formosa:

A large quantity of miscellaneous parts for freight wagons including springs, wheels and axles, brake rigging, couplers, draft gear, and air brake equipment.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan (Formosa). The tender No. is US-678B. This purchase will be financed by the International Co-operation Administration (I.C.A.), the agency through which the United States Government gives economic and technical assistance to other countries. The closing date is December 22, 1959. The Board of Trade reference is ESB/27677/59 I.C.A.

5 sets of parts for 30-ton gasoline tank wagons, including couplers, four-wheel bogies, air brakes, and mild steel channels.

The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping, Nan Lu, Taipei, Taiwan. The tender No. is GFC-5930. The closing date is December 10, 1959. The Board of Trade reference is ESB/27807/59.

From Portuguese East Africa :

200,000 rail spikes.

The Issuing Authority is the Ports, Railways & Transport Department, Lourenco Marques. The tender No. is 3/60. A provisional deposit of Esc: 17,500 must be made by tenderers. The closing date is February 19, 1960. The Board of Trade reference is ESB/27943/59.

Further details relating to the above tenders together with photo-copies of tender documents can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

The Agent-General has been informed by the Queensland Railways that an invitation to tender has been issued for two 153-h.p. 2-6-0 diesel-mechanical locomotives. Tenderers are required to quote for the manufacture, supply and delivery f.o.r. on a 3 ft. 6 in. gauge railway siding in Queensland. Offers must reach the office of the Commissioner for Railways, Adelaide Street, Brisbane, not later than January 14, 1960. Drawings and tender documents are available for perusal at 409 & 410, Strand, London, W.C.2, but may be purchased direct from the Commissioner at a cost of £25 (Australian currency) plus forwarding charges. These amounts will not be refunded.

Tenders are also required for 200 20-ton " VTX " hopper ballast wagons to be submitted not later than January 12, 1960. Drawings and tender documents are available at a cost of £A11.

The Export Services Branch, Board of Trade, has been advised that bids submitted against a call from Panama for electric towing locomotives, reported in our issue of June 26-August 14, 1959, have not been accepted and further bids are to be invited. Copies of bid schedules, drawings, and specifications may be obtained in the office of the Designing Engineer, Balboa Heights, Canal Zone. A deposit of $25 will be required. The closing date is January 4, 1960.

The work, in general, consists of furnishing and installing approximately 39 electric towing locomotives and three electric cranes for use on the Panama Canal locks to replace the existing electric locomotives and electric cranes. These new locomotives will weigh about 45 tons each; they will have two towing cables controlled by level wind winches with a maximum available tension of 35,000 lb. on each cable. The locomotives must be able to exert a towing force of 70,000 lb. and must be able to tow ships and negotiate inclines at 1, 2 and 3 m.p.h. and run light at 6 and 9 m.p.h. on level track. The electric cranes are to have 35 ft. long booms and have maximum lift capacity of 14 tons. The traction units of the cranes are to be interchangeable with the locomotive traction units. Approximately 2½ years will be allowed for completion of the work.

The Board of Trade reference is ESB/8343/59.

Notes and News

Collapse of Signalbox During Removal.—A youth was killed and three men injured when an unused signalbox collapsed last week, at Colchester North, British Railways, Eastern Region. Seven men, all employees of the contractors, were demolishing the box when the accident occurred.

Tube Investments Limited, Strong Recovery.—Results for the year to July 31, 1959, by Tube Investments Limited showed a strong recovery towards the end of the year with group trading profits of £12,617,000 (£12,579,244) after depreciation of £4,165,643 (£3,525,560). Total assets rose from £100,267,918 to £147,516,507. The meeting will be in Birmingham on December 14.

Fire Under Railway Extinguished and Embankment Rebuilt.—The fire under the railway embankment which caused the temporary closure of the main line of British Railways, Eastern Railway, between Dronfield, Unstone, Sheepbridge and Tapton Junction (north of Chesterfield) from November 22, has now been extinguished and the work of replacing the railway embankment is proceeding rapidly. Normal passenger train services have been resumed over the section. During the eight-day closure of the line the whole section of the embankment was removed with the aid of excavators and bulldozers. A special road was constructed across the 50-yd. from the main road to the railway line, over which lorries brought material for the rebuilding of the embankment.

Railway Club Diamond Jubilee Dinner.—The diamond jubilee dinner of the Railway Club was held at the Danish Club, Knightsbridge, London, S.W.1, on November 28. The Chair was taken by the President, Mr. T. S. Lascelles, supported by the Vice-Presidents, Messrs. Charles E. Lee, D. S. M. Barrie, and H. A. Vallance, and 84 members and guests were present. Sir John Elliot, Chairman of Thomas Cook & Sons Ltd., was the principal guest. In proposing the toast of the Railway Club, the President expressed his gratification that the club, the oldest of the organisations for railway enthusiasts, had reached its diamond jubilee

with its membership steadily increasing and interest in railways undimmed. The toast of the officers and the executive committee was proposed by Mr. C. F. Klapper, with response by the Hon. Secretary, Mr. B. D. J. Walsh. The toast of "Our Guests" was given by Mr. D. S. M. Barrie. In his response, Sir John Elliot recalled several amusing incidents from his own railway career.

French Railways Limited Change of Address.—French Railways Limited will occupy, from December 7, premises at 10, Haymarket, London, S.W.1, tel. Whitehall 3822, during erection of the new office building on the site occupied by French Railways Limited and one of its predecessors, the former Paris Lyons & Mediterranean Railway Company, since 1906. The temporary telegraphic address is Sonafer, Lesquare, London.

Kenya Railway Strike Ends.—Mr. Tom Mboya, General Secretary of the Kenya Federation of Labour, and officials of the Kenya Railway African Union last week persuaded a mass meeting of African strikers to go back to work. They had been on strike since November 13, in protest against the alleged abuse of African staff by a Nairobi building supervisor. It was agreed that an investigation would be made into the strikers' complaints.

No Special B.T.C. Christmas Cards.—The British Transport Commission has decided not to issue its own special Christmas card this year. Apart from the expense, the Commission, like other bodies, feels that what was once a personal gesture has become a somewhat formal act of commercial routine, and that this is not the right spirit in which cards should be sent. It hopes that this decision will not affect its cordial relations with those who would otherwise have received Christmas cards.

British Standard for Braided Travelling Cables for Electric Lifts.—A revision of the British Standard publication for braided travelling cables for electric lifts, BS 977 : 1959, is confined to braided cables, the design of which has been improved to give increased flexibility. A new flexibility test has been introduced and the fire-resistance test has been made more stringent. The electrical requirements are generally in accordance with those for general-purpose rubber-insulated cables given in BS7. Copies, price 4s., may be obtained from the British Standards Institution, 2, Park Street, London, W.1.

Canadian National Railways Bond Issue.—The Canadian National Railways is making a $300,000,000 issue. The loan is guaranteed by the Canadian Government and is payable in Canadian dollars only. The issue will take the form of two tranches. The first is a 5¾ per cent issue dated January 1, 1985, and priced at 98½; the issue is not callable. The second leg is a 5½ per cent issue dated December 15, 1964, and priced at 98½ also. This is also not callable, but this leg of the issue may be converted at the option of the holder up to June 15, 1964, into a 5½ per cent bond dated December 15, 1971; this bond is also not callable.

Institute of Metals Symposium.—An all-day symposium on "The Powder Metallurgy of Magnetic Materials," arranged by the Powder Metallurgy Joint Group of The Iron and Steel Institute and the Institute of Metals, will be held in the Hoare Memorial Hall, Church House, Great Smith Street, London, S.W.1, on December 16, starting at 9.30 a.m. The papers to be presented and discussed describe original work and are printed in "*Powder Metallurgy*," Part 4, published at the end of November (price 12s. 6d., post free, to non-members). An informal conversazione will follow at the Institute of Metals, 17, Belgrave Square, S.W.1, from 7.30 to 10.30 p.m. Tickets, price, 10s., including refreshments, may be obtained from the Secretary at 17, Belgrave Square. Visitors will be welcome, both at the symposium and conversazione; tickets for the meeting are not required.

Saunders Valve Co. Ltd. Dividend.—The interim dividend of the Saunders Valve Co. Ltd. for the year ending April 30, 1959, is increased to 7½ from 4½ per cent for 1958-59. The directors emphasise that the increase is designed to reduce the disparity between the interim and final dividends and has no other significance. During the current year orders received and sales have been at a higher level than last year.

Record British Transport Advertising Receipts.—Two new records for advertising revenue have been announced by British Transport Advertising, the commercial advertising service of the British Transport Commission. In the quarter ended September 30, 1959, the amount paid by advertisers for space on British Railways stations, roadside sites, and other railway properties was £243,532. The provincial buses of the Tilling Group further increased their popularity as an advertising medium to £98,740 for the same period, the highest ever for any quarter since the establishment of the service in 1949.

Difficulty of Lowering Road Haulage Rates.—The difficulty for road hauliers of reducing their charges was stressed by Mr. R. B. Brittain, Chairman of the Eastern Area of the Road Haulage Association, at the Area dinner on November 30. Road hauliers he stated, might not be so much subject to the costs of raw materials as were manufacturers, but the costs of oil fuel, of wages and salaries, and of overheads were the major items in their outgoings, and most of these items had increased in cost to the road haulage industry. They were grateful to the Chancellor of the Exchequer for his removal of purchase tax on the chassis of vehicles. This did not mean that they could immediately cut every rate. They had had two wage increases and a third was in negotiation since their last rates increase over two-and-a-half-years ago. One reason why road hauliers could not give a lead in price reductions was that they had been giving such a lead for the past few years, but rates had now reached an irreducible minimum. Since de-nationalisation road haulage rates had been cut by an average of 25 per cent.

Railways on Riviera Cut by Storms.—Recent storms on the Riviera and in the Alps interrupted railway services in several places. The line from Nice to Ventimiglia was blocked by a landslide on the Italian side of the frontier.

Frictionally Controlled Buffer Stops Tested at Manchester, London Road.—The first two examples of a new design of frictionally controlled buffer stop to be installed by British Railways were given preliminary tests recently at the main arrival platforms 11 and 12 of London Road Station, Manchester, London Midland Region. The stops are part of a batch of 12 being manufactured for British Railways by Godwin Warren (Engineering) Limited of Bristol. They are of the sliding sleeper type similar to that illustrated in our April 24, 1959, issue.

Production of Modac Connectors Transferred to Swindon.—The Plessey Co. Ltd. announces that production of the entire range of Modac connectors, hitherto carried out by its associated company, Modern Acoustics Limited, at Boreham Wood, Herts, has been transferred to the Wiring & Connectors Division of Plessey at Cheney Manor, Swindon. This is in accordance with the policy of centralising the production of allied products and services. The new factory at Cheney Manor now accommodates the firm's entire production of electrical connectors, pre-formed wiring, and ignition harness.

Opening of Continental Car Ferry Centre

(*See editorial on page 502*)

Sir Philip Warter, Chairman, Southern Area Board, right, accompanied by Mr. C. P. Hopkins, General Manager, British Railways, Southern Region, left, being shown the Cardmaster machine

Forthcoming Meetings

December 8 (*Tue.*).—Permanent Way Institution, York Section, at the Railway Institute, York, at 6.45 p.m. Annual general meeting, followed by short papers.

December 8 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Paper on "Current railway developments," by Mr. C. Wills, B.T.C. Headquarters, 222, Marylebone Road, N.W.1.

December 8 (*Tue.*).—Institution of Railway Signal Engineers, York Section, at the Signalling School, Toft Green, York, at 5.30 p.m. Paper on "The problems of a District Traffic Superintendent's Inspector," by Mr. H. Blackburn.

December 8 (*Tue.*).—Institute of Transport, Scottish Section, at 46, Bath Street, Glasgow, at 6 p.m. Paper on "A visit to the Russian railways," by Mr. M. G. Maycock, Chief Civil Engineer, British Railways, Scottish Region.

December 8 (*Tue.*).—Institute of Transport, Yorkshire Section, at the Griffin Hotel, Leeds, at 6.30 p.m. Paper on "Some economic problems of transport," by Mr. D. L. Munby, Reader in Economics and Organisation of Transport, University of Oxford.

December 10 (*Thu.*).—British Railways, London Midland Region, Lecture & Debating Society, in the Clerical Staff Dining Club, Cardington Street, Euston, N.W.1, at 5.45 p.m. Paper on "The work of the civil engineering department," by Mr. A. N. Butland.

December 10 (*Thu.*).—Institution of Electrical Engineers, at Savoy Place, London, W.C.2, at 5.30 p.m. Paper on "The characteristics and protection of semi-conductor rectifiers," by Mr. D. B. Corbyn and Mr. N. R. Potter.

December 10 (*Thu.*).—Institute of Transport, Northampton Group, at the United Counties Offices, Houghton Road, Northampton, at 7 p.m. "Come with me to Copenhagen." An account by Mr. J. T. E. Robinson of the visit of the Institute of Transport to Denmark. Illustrated by films and slides.

December 12 (*Sat.*).—Permanent Way Institution, East Anglia Section, at Ipswich, at 2.15 p.m. Paper on "Modern trends in tunnelling practice," by Mr. J. Kell.

December 12 (*Sat.*).—Railway Correspondence & Travel Society, Sussex & Kent Branch, at the Railway Hotel, Brighton, at 7 p.m. Paper on "My life on the line," by Mr. G. S. Tanner.

December 14 (*Mon.*).—Institute of Transport, in the Jarvis Hall (R.I.B.A.), 66, Portland Place, W.1, at 5.45 p.m. Spurrier Memorial Lecture "Government and roads and road transport," by Mr. L. J. Dunnett.

December 15 (*Tue.*).—Institute of Locomotive Engineers, at the Institute of Mechanical Engineers, 1, Birdcage Walk, S.W.1, at 5.30 p.m. Paper on "Methods of reducing flange wear on diesel and electric bogie locomotives," by Mr. W. L. Topham.

December 16 (*Wed.*).—Permanent Way Institution, London Section, at the Headquarters of the British Transport Commission, 222, Marylebone Road, N.W.1, at 6.30 p.m. Paper on "Tools and equipment, past, present, and future," by Mr. D. R. James.

December 16 (*Wed.*).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. Paper on "The British locomotive industry," by Mr. G. T. Owen, Chairman, Locomotive & Allied Manufacturers' Association of Great Britain.

December 17 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Railway quiz—Questions on railway operation and administration. Question master, Mr. H. G. Bowles.

December 17 (*Thu.*).—Institution of Locomotive Engineers, at the Dorchester Hotel, Park Lane, W.1. Dinner and dance.

December 17 (*Thu.*).—Institute of Transport, East Midlands Section, in the City Transport Recreation Club, Leicester, at 1 p.m. Paper on "British Transport Commission—public relations," by Mr. E. Merrill, Chief Public Relations Officer, B.T.C.

December 17 (*Thu.*).—Diesel Engineers & Users Association, in the Institute of Marine Engineers, The Memorial Building, 76, Mark Lane, E.C.3, at 2.30 p.m. "Report on heavy oil engine working costs and performance, 1958/59," and an informal discussion on "operating problems."

December 18 (*Fri.*).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, N.W.1, at 7.15 p.m. Paper on "The contribution of locomotive testing to dieselisation on the Western Region, with some reference to comparative steam and diesel locomotive performance," by Mr. S. O. Ell, Assistant to the Chief Mechanical Engineer, British Railways, Western Region, Swindon.

Railway Stock Market

Less active and rather more cautious conditions ruled in stock markets and values were again slightly reactionary, though individual features of strength were not lacking among industrial shares. Financial results, which show a fair number of dividend increases, helped sentiment, and the view has gained ground, that although stock markets may display some uncertainty and small irregular movements in the next few weeks, an upward trend is probable early in the new year.

Only a moderate business passed among foreign rails, and Antofagasta remained reactionary. The ordinary stock declined afresh to 15¾, compared with 18¼ a week ago, and the preference stock declined from 30¾ to 27, though the 5 per cent (Bolivia) debentures remained at 94½.

Chilean Northern 5 per cent first debentures marked 60, Costa Rica ordinary stock around 20⅞ and Guayaquil & Quito assented bonds 79. Paraguay Central prior debentures changed hands at 16½. Brazil Railway bonds changed hands at 7¼, San Paulo Railway 3s. units were 1s. 6¾d., and United of Havana second income stock kept at 6 and the consolidated stock at 1. Mexican Central "A" bearer debentures were 56½.

Canadian Pacifics have come back from $46½ a week ago to $45½. The 4 per cent preference stock remained at 62½ and the 4 per cent debentures at 67 were also maintained on balance. White Pass shares were $13½, compared with $13⅝ a week ago.

Business up to 11s. 7½d. was recorded in Nyasaland Railways shares and at 55 in the 3½ per cent debentures. Barsi stock marked 28 and West of India Portuguese 106½.

There have been mixed movements among shares of locomotive builders and engineers. Beyer Peacock 5s. shares reacted to 8s. 3d., but Wagon Repairs 5s. shares were 11s. 6d. compared with 10s. 3d. a week ago, and Charles Roberts 5s. shares held steady at 18s. 4½d. Gloucester Wagon 10s. shares have reacted from 16s. 3d. to 15s. 3d. and Birmingham Wagon from 31s. 3d. to 29s. 9d. North British Locomotive at 8s. 10½d. were virtually the same as a week ago. G. D. Peters held their rise to 20s. 7½d.

In other directions, Westinghouse Brake receded further from 51s. 6d. to 50s. 3d. Ruston & Hornsby have provided a good feature with an advance to 29s. 6d. compared with 26s. a week ago, and Vickers improved to 29s. 1½d. Power Gas Corporation shares strengthened to 71s. 3d. in front of the take-over terms from Davy-United. Davy-United shares were 105s. Allied Ironfounders were 71s., an advance of 10s. following the higher interim dividend. Crompton Parkinson 5s. shares eased to 17s. 1½d. Reflecting the easier trend in stock markets generally, Associated Electrical were 60s.xd., compared with 61s. 6d. a week ago, and General Electric 42s. 9d. compared with 43s. 6d. but English Electric strengthened from 44s. 6d. to 44s. 9d. B.I. Cables were good at 54s.xd compared with 52s. 9d. a week ago.

Dowty Group 10s. shares advanced from 45s. 3d. to a new peak of 48s. 9d. Pressed Steel 5s. shares were 40s. 3d. compared with 41s. Pollard Bearing 4s. shares at 35s. were the same as a week ago. Stone-Platt eased from 61s. 3d. to 60s. 3d. but in other directions, T. W. Ward advanced strongly from 146s. 3d. to 157s. 6d. Ransomes & Marles 5s. shares at 25s. 3d. were within 3d. of a week ago. Steel shares have not kept best prices, but remained active, awaiting dividend announcements.

OFFICIAL NOTICES

BRITISH TRANSPORT DOCKS invite applications for SENIOR ENGINEERING ASSISTANTS in the Office of the Civil Engineer, South Wales Docks, Barry, Glam.

Candidates should be Corporate members of the Institution of Civil Engineers with extensive experience in the design, specification, construction and execution of general civil engineering works, preferably with some knowledge of dock and harbour installations. Salary range, £1,095—£1,265 per annum. Contributory Superannuation scheme and certain rail travel facilities.

Applications, stating age, education, training, experience and qualifications, to be sent to: Staff & Establishment Officer, British Transport Docks, 163, Euston Road, London, N.W.1, to arrive not later than Friday, December 11, 1959.

THE DIRECTOR GENERAL, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of:—

	Quantity Nos.
Helical Springs for Bogie Bolster in Silico Manganese Spring Steel	1,540

Forms of tender may be obtained from the above address on or after December 4, 1959, upon payment of a fee of 10s. which is not returnable. If payment is made by cheque, it should please be made payable to "High Commissioner for India." Tenderers must send their tenders so as to reach this office by 2 p.m. on Thursday, January 7, 1960.

Please quote Reference No. 44/59. DB/RLY.2.

BRITISH INSULATED CALLENDER'S CONSTRUCTION COMPANY, LTD. RAILWAY ELECTRIFICATION.

Qualified engineering staff required for duties in connection with the installation of overhead equipment for Railway Electrification.

Attractive salaries and excellent conditions of service, including superannuation and bonus schemes.

Applications to: Works Personnel Officer, Ref. No. C.867, B.I.C.C., Ltd., Prescot, Lancashire.

SHOTBLASTING in-situ by the "on-site" experts. Organic and Inorganic Coatings applied. Anything, anywhere at competitive rates. Darnall Shotblasting Co. Ltd., Doctor Lane, Sheffield ,9. Telephone 42896.